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United States Department of the Interior
Bureau of Land Management

Taos Field Office

Draft

Environmental Impact Statement for Riparian and Aquatic Habitat Management in the Taos Field Office – New Mexico

October 1999

BLM/NM/PL-99-013-1040

2000-003890/NF C

Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Notice

This draft document should be retained to be used in conjunction with the final document. If changes resulting from public review and comment on the draft are relatively minor, the final document will include the modifications and corrections which should be made to the draft text as a result of public review and comments, as well as a record of public comments on this draft and responses to those comments.

BLM/NM/PL-99-013-1040

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Taos Field Office
226 Cruz Alta Road
Taos, New Mexico 87571
www.nm..blm.gov

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Impact Statement for Riparian and Aquatic Habitat Management in the Taos Field Office. This document presents a range of alternatives for restoring and protecting riparian habitats under the jurisdiction of the Bureau of Land Management (BLM). The alternative selected for implementation following review and analysis of comments received on the Draft EIS will be described as the Taos Riparian and Aquatic Habitat Management Plan in the Final EIS. We would very much appreciate your careful review and submission of comments on the Draft so that we can include your contributions in the preparation of the Final.

One alternative, the grazing management alternative, which would eliminate grazing by domestic livestock in riparian areas may require a Taos Resource Management Plan Amendment (RMPA). If this occurs, the BLM plans to use this draft document and the Final Taos Riparian and Aquatic Habitat Management Plan and EIS for the RMPA process. Because the RMPA process requires a 90 day comment period, the comment period will start October 15, 1999 and end January 12, 2000.

Please direct your written comments to Pam Herrera, BLM Project Leader, at the address shown below. Written comments must be postmarked no later than January 12, 2000. Comments on the alternatives and the adequacy of the impact analysis are most useful if they address one or more of the following:

Errors in the analysis
New information that would have a bearing on the analysis
Misinformation that could affect the outcome of the analysis
Requests for clarification
A substantive new alternative that is different from any of the existing alternatives
Where applicable, refer to the pages and paragraphs to which the comments apply

Please mail your comments on this draft to:

Pam Herrera, Project Leader
Bureau of Land Management
Taos Field Office
226 Cruz Alta Road
Taos, NM 87571

Written comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours Monday through Friday, except holidays, and be published as part of the proposed plan and final EIS. Individual respondents may request confidentiality. If you wish to withhold your name and street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such request will be honored to the extent allowable by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

In addition to accepting written comments the following will be held:

Open House - Preceding the public hearing an open house will be held where the public can informally discuss with BLM staff the Draft EIS and the riparian program. The open house will be in the same room as the public hearing.

Public Hearing - Formal verbal comments on the alternatives and the adequacy of the analysis in the Draft will be received at a public hearing.

The date, location, and time of the open house and public hearing are as follows:

November 15, 1999
BLM Taos Field Office,
226, Cruz Alta Road
Taos, NM

Open house starts at 6:00 pm
Public Hearing starts at 7:00 pm

Registered speakers will continue to be heard until those signed up to speak have had an opportunity to do so. Because a 5-minute time limit will be placed on all verbal comments, it is helpful to provide a written summary of remarks to make sure all the important points are included in the record.

All comments will be fully considered.

This Draft EIS is your copy, please retain it. The Final EIS and Proposed Plan, if an RMPA is necessary, may be printed in abbreviated form in which case this draft will be used as a reference document.

Sincerely,

Ron Huntsinger

Ron Huntsinger, Manager
Taos Field Office

ABSTRACT

Environmental Impact Statement for Riparian and Aquatic Habitat Management in the Taos Field Office – New Mexico

Draft (x)   Final ( )

United States Department of the Interior, Bureau of Land Management (BLM)

1. Type of Action: Administrative (x)   Legislative ( )

2. Proposed Action: To restore and protect riparian habitats under BLM jurisdiction in the Taos Field Office, which includes all or parts of Colfax, Harding, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, Taos, and Union Counties. Riparian habitats in the Rio Grande and Rio Chama watersheds that are included in the Rio Grande Corridor Proposed Plan and Final Environmental Impact Statement and the Rio Chama Management Plan are outside the scope of this proposed action.

3. Abstract: This environmental impact statement (EIS) addresses three alternatives to accomplish the Proposed Action. The first alternative is the continuation of current management direction to improve riparian habitats in context with authorizing other land management activities. This is also the No Action Alternative. The second alternative is adaptive management, which places priority on restoration and protection of all riparian habitats under BLM jurisdiction. This is also the Preferred Alternative. The third alternative is grazing management, which would eliminate grazing by domestic livestock in riparian areas. The grazing management alternative may require a Taos Resource Management Plan amendment. Selection of an alternative to accomplish the Proposed Action will be made following analysis of comments received on all alternatives presented in the Draft EIS. The alternative selected for implementation will be described as the Taos Riparian and Aquatic Habitat Management Plan in the Final EIS.

4. For further information contact: Pam Herrera, BLM Project Leader
   Bureau of Land Management
   226 Cruz Alta Road
   Taos, New Mexico 87571
   505-751-4705

5. Comments on the draft must be postmarked no later than January 12, 2000, and must be sent to the address listed above. To be most useful, comments on the draft should be as specific as possible and address the adequacy of the analysis, the merits of the alternatives discussed, or both.

6. Date Draft Filed with EPA: October 8, 1999.

7. Recommended: ____________________ Approved: ____________________
   Ron Huntsinger   M. J. Chávez
   Field Manager   State Director

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ACRONYMS/ABBREVIATIONS

ACEC	area of critical environmental concern
AMP	allotment management plan
AUM	animal unit month
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COE	Corps of Engineers
CRMP	coordinated resource management plan
CWA	Clean Water Act
DEIS	draft environmental impact statement
DOI	Department of the Interior
EIS	environmental impact statement
ESA	Endangered Species Act
FAR	functional – at risk
FR	*Federal Register*
GAO	General Accounting Office
HMP	habitat management plan
MSL	(above) mean sea level
NEPA	National Environmental Policy Act
NF	nonfunctional
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
ORV	off-road vehicle
PFC	proper functioning condition
ppm	part(s) per million
RCRA	Resource Conservation and Recovery Act
RMP	resource management plan
SMA	special management area
TMDL	total maximum daily load
TR	technical reference
U	unknown
U.S.C.	*United States Code*
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWA	unified watershed assessment
WSA	wilderness study area

SUMMARY

This Bureau of Land Management (BLM) Taos Field Office *Draft Environmental Impact Statement* (DEIS) *for Riparian and Aquatic Habitat Management* develops, presents, and analyzes three alternative management strategies for restoring and protecting riparian habitats under the Taos Field Office jurisdiction. Following public review and comment on these strategies, an alternative will be selected for implementation and will be described in the Final EIS as the Taos Riparian and Aquatic Habitat Management Plan (HMP).

Although the BLM has been implementing restoration and protection actions for selected riparian areas in New Mexico for over a decade, specific riparian habitat management plans for individual Field Offices, long-term implementation plans for stewardship of riparian areas, and development of measurable goals and endpoints for restoration activities have not been undertaken because of informational and planning needs. For example, additional scientific data for riparian habitats need to be obtained and utilized, and more proactive strategies for accomplishing riparian-wetland management objectives have to be developed and implemented.

Some program elements are common to all the alternatives evaluated in this DEIS. For example, each alternative applies to a management strategy for the aggregate of all riparian areas under BLM Taos Field Office jurisdiction. Each alternative is capable of accomplishing the proposed action of restoring and protecting riparian habitats on lands under BLM jurisdiction. Other land management activities will continue within the Field Office, regardless of which alternative is selected for the management of riparian areas, and to the extent that they are not inconsistent with decisions affecting riparian habitat restoration and protection.

The alternatives presented in this DEIS are as follows:

Alternative 1: Current Management (No Action Alternative) — Continue to manage riparian areas in accordance with applicable BLM guidance with the objective of restoring and protecting such areas in context with authorizing other land management activities. Current management has already restored some riparian areas by removing domestic livestock from many riparian areas either completely or during the growing season, as well as by implementing other management practices.

Alternative 2: Adaptive Management (Preferred Alternative) — Assign highest priority to implementing those management practices identified in current BLM management guidance to restore and protect all riparian habitats under BLM jurisdiction. This alternative would require a specific focus on riparian management; decisions regarding other land management activities would be constrained to limit or prevent any adverse impact on riparian areas.

Alternative 3: Grazing Management — Eliminate grazing by domestic livestock in riparian areas by modifying grazing allotments to exclude such areas. For each allotment affected, this action would include changing the description of the allotment, installing fences or other physical barriers to prevent livestock from entering riparian areas, and, if appropriate, adjusting the number of livestock permitted to use the modified allotment. Selection of this alternative may require a change in the Taos Resource Management Plan (RMP).

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Table S.1 shows a comparison of impacts for each of the three alternatives being evaluated.

Riparian management goals and objectives addressed in this DEIS include maintenance of existing riparian areas, improvement of degraded riparian conditions, recovery of lost riparian areas, and development of new riparian areas. Alternative strategies for accomplishing these goals and objectives are measured within the context of four criteria: (1) attainment of proper functioning condition (PFC), (2) protection of wildlife and species of special concern, (3) protection of cultural resources, and (4) balancing of socioeconomic considerations. The principal management issues considered in the analysis of alternative strategies are grazing, recreation, water development, and invasive species.

Graphic materials included in this DEIS show individual riparian areas under BLM jurisdiction in context with other features, activities, and land jurisdictions. For example, some figures show the relationship between the riparian areas and livestock grazing allotments. Others show the distribution of riparian areas under BLM jurisdiction relative to the surface hydrology network within the entire Taos Field Office area. The figures underscore the fact that riparian habitats are critical, but very small, areas in relation to the large amount of land administered by the BLM. In addition, segments of riparian areas under BLM jurisdiction are often only a small part of a larger area under other jurisdictions over which the BLM has no management responsibility or authority. This observation is central to gaining an appreciation of the important, but limited, role the BLM plays in improving and protecting riparian habitats in New Mexico.

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TABLE S.1 Environmental Impact Statement Summary Table for Taos Field Office

Issue/Action Item	Alternative 1 - Current Management (No Action Alternative)	Alternative 2 - Adaptive Management (Preferred Alternative)	Alternative 3 - Grazing Management
Management Approach			
General Approach	Restore and protect riparian areas while conducting other authorized uses of public land. The Taos RMP and associated amendments contain specific management guidance.	An adaptive management approach develops explicit goals for which progress can be measured by a set of specific endpoints (desired future condition, such as, PFC, increased use by special status species, improved natural vegetation). Results from monitoring data determine future restoration requirements or required management adjustments.	Modify grazing allotments to eliminate grazing from all riparian habitats.
Data Collection	Use PFC surveys to determine data collection requirements.	Develop specific survey techniques for each endpoint.	Same as Alternative 1.
Monitoring	Monitor the condition of the riparian habitat at yearly intervals using PFC surveys. Additional monitoring requirements may be contained in the Taos RMP and associated amendments.	Monitor riparian habitat conditions at intervals defined by the sampling requirements of each endpoint. Sampling should provide quantitative results to support defensible decision-making for adapting to a revised management approach.	Same as Alternative 1.
Measurement Endpoints	The measurement endpoint is attaining PFC in as many riparian areas as practicable within a reasonable time frame. Progress toward this end is determined by PFC surveys, including observations and assessments of habitat components.	Specific endpoints that determine progress in meeting goals are used to measure the status of riparian habitat conditions. The status of the endpoints is used by managers and the public to determine progress in achieving the desired future condition.	Same as Alternative 1.

TABLE S.1 (Cont.)

Issue/Action Item	Alternative 1 - Current Management (No Action Alternative)	Alternative 2 - Adaptive Management (Preferred Alternative)	Alternative 3 - Grazing Management
Riparian Developments	Developments performed according to data obtained from periodic surveys or the Taos RMP, if funds are available.	Developments would be performed consistent with meeting the desired future condition endpoints identified in the HMP as quickly as possible.	Installation of fencing or other grazing exclusion devices would be needed to restrict access to riparian areas by domestic livestock on all allotments that contain BLM riparian habitat.
Restoration Activities	Activities as identified in the Taos RMP and associated amendments.	Restoration activities identified as a function of the desired future condition for the endpoints identified in the HMP.	Same as Alternative 1.
Potential Impacts			
Vegetation			
Riparian	Current management would improve riparian conditions undergoing restoration. In habitats not currently being restored, vegetation condition would be subject to natural and human use impacts.	All riparian areas would be incorporated into restoration plans. Vegetation conditions would be expected to improve overall.	Riparian vegetation would improve in the absence of grazing by domestic livestock. Improvements would occur in habitats currently subject to domestic livestock grazing.
Upland	No change from current condition.	May improve, if required to meet HMP riparian endpoints.	May be improved to provide forage for livestock that no longer have access to riparian habitats.
Invasive Species	Current weed control programs would be maintained, including controlled burns and the use of herbicides.	An active control program would be developed with an expectation that all riparian habitats would have a measurable reduction in invasive species.	The elimination of domestic livestock grazing would result in a reduced potential for invasive species dominance.

TABLE S.1 (Cont.)

Issue/Action Item	Alternative 1 - Current Management (No Action Alternative)	Alternative 2 - Adaptive Management (Preferred Alternative)	Alternative 3 - Grazing Management
Special Status Species	Consult with U.S. Fish and Wildlife Service to assure compliance with all requirements of Section 7 of the Endangered Species Act. Surveys would continue to be conducted to determine the status of federally listed species.	Same as Alternative 1.	Same as Alternative 1.
Wildlife Habitat	Improvement would occur in areas undergoing current restoration.	Specific habitat endpoints would be established for all riparian areas. Over the long-term, restoration activities to meet the endpoints would result in measurable habitat improvement.	The elimination of domestic livestock grazing would result in improved habitat conditions for native bird, fish, and mammal populations.
Soil Erosion/Deposition	Some improvement in soil erosion and deposition rates.	Improvement in soil erosion and deposition would be better than Alternative 1.	The elimination of domestic livestock grazing should result in deceases in erosion and deposition, especially if current practices allow year-long access to riparian areas. However, cut banks and gullies would not improve unless active restoration occurs.
Water Quality and Quantity	Small improvements in water quality from decreased erosion, little change in water quantity, except in selected intensive restoration projects.	Small improvements in water quality from decreased erosion and deposition, little change in water quantity, except in selected intensive restoration projects that result in new wetlands or water storage developments.	Elimination of domestic livestock grazing would result in improvement in water quality from decreased sediment loads. However, water quantity and quality would be primarily determined by the overall condition of the watershed.

TABLE S.1 (Cont.)

Issue/Action Item	Alternative 1 - Current Management (No Action Alternative)	Alternative 2 - Adaptive Management (Preferred Alternative)	Alternative 3 - Grazing Management
Livestock Grazing			
Allotments	Currently, grazing is excluded on 460 acres of riparian habitat, while it is allowed on 1,594 acres. No changes from current grazing allotments.	The 1,594 acres of riparian habitat currently grazed would be evaluated to determine the best adaptive management strategy for each area. Future management actions would be based on information gathered from the monitoring data. No changes in allotment boundaries, but grazing in riparian areas could be reduced from current levels, if data collection and analysis indicated the need to alter current grazing practices.	All of the 1,594 acres of riparian habitat on which grazing is currently permitted would be excluded from future grazing. Allotments would be adjusted in order to remove all riparian habitats from domestic livestock grazing.
Grazing Treatments	New and revised allotment management plans would meet riparian and water quality needs. Fencing and other means of exclusion to be utilized when management systems alone cannot meet objectives.	Grazing protocols to be identified for each site and may include treatment as Riparian Pasture, Winter Grazing, or Total Rest. Treatment may be modified to promote site-specific riparian objectives.	Grazing prohibited from all riparian habitats.
Oil, Gas, and Mineral Development	Management actions and stipulations would be designed to be compatible with riparian habitat management goals. Riparian buffer zones would be identified and provided for in exploration and development.	Development would be excluded from all riparian habitats.	Similar to Alternative 1.
Areas of Critical Environmental Concern (ACECs) and Special Management Areas (SMAs)	No change in current management approaches.	Same as Alternative 1.	Same as Alternative 1.

TABLE S.1 (Cont.)

Issue/Action Item	Alternative 1 - Current Management (No Action Alternative)	Alternative 2 - Adaptive Management (Preferred Alternative)	Alternative 3 - Grazing Management
Social and Economic			
Recreation	No change from current condition.	Would be modified to be compatible with site-specific riparian habitat goals.	Fencing and other exclusionary devices to control domestic livestock use may preclude access for some recreational activities.
Land Exchanges	Riparian habitat would not be disposed of unless such action would be in the public interest.	Adjacent upland or riverine lands would be acquired when necessary in order to better meet site-specific riparian habitat goals.	Riparian habitat would not be disposed of unless such action would be in the public interest.
Water Withdrawals	No impact on water withdrawals.	Water holding basins or wetland areas may be created to improve riparian habitat.	Possible relocation of domestic livestock water projects.
Environmental Justice	No impacts expected.	No impacts expected.	No impacts expected.
Cultural and Paleontological Resources	No impacts expected.	Reduced erosion rates should protect resources.	Reduced erosion rates should protect resources.

1 INTRODUCTION

1.0 PURPOSE AND NEED

The purpose of this environmental impact statement (EIS) is to analyze the probable environmental effects of implementing the proposed action to restore and protect riparian habitats under the jurisdiction of the Bureau of Land Management (BLM) in the Taos Field Office. Although BLM has been actively managing riparian habitats for over a decade, the need to place additional emphasis on these important resources was triggered by legal action against BLM. Following public review and comment on the preferred and other alternatives in the Draft EIS (DEIS), the alternative selected for implementation will be described in the Final EIS as the Taos Riparian and Aquatic Habitat Management Plan (HMP). The HMP will then become the primary guidance document for managing riparian and aquatic habitats in the Taos Field Office.

Riparian habitats in the Rio Grande and Rio Chama watersheds that are included in the Rio Grande Corridor Proposed Plan and Final EIS and the Rio Chama Management Plan are outside the scope of this analysis.

1.1 BACKGROUND

The BLM defines a "riparian area" as an area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and stream banks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.

Riparian areas are the green zones that occur on lands that are inundated or saturated by surface or groundwater. They are the link between aquatic environments and upland, terrestrial ecosystems. Riparian areas are intimately related to their adjacent waterways because the presence of water for all or part of the growing season is their distinguishing characteristic. Moreover, the nature and condition of the riparian area abutting a stream channel fundamentally affects the aquatic ecosystem (Ehrhart and Hansen 1998).

For over a decade, the BLM has emphasized the restoration and protection of streamside riparian areas in New Mexico for the benefit of threatened and endangered species, as well as for other riparian-dependent species. Although much has been accomplished to meet the agency goals for riparian area improvement, much more remains to be done. For example, more scientific data about riparian habitats need to be obtained and utilized, and more proactive strategies for accomplishing riparian-wetland management objectives need to be developed and implemented.

Notwithstanding its riparian management emphasis, the BLM was challenged in a lawsuit alleging it failed to comply with several laws related to land use planning and resource management and particularly to the protection of endangered species in riparian habitats. The lawsuit was settled when the BLM agreed to prepare four separate EISs to address riparian habitat management in four of the seven field offices in New Mexico, including the Taos Field Office. The settlement agreement was reached on September 10, 1998.

The time allowed for completion of the four EISs, coupled with the time-related procedural requirements for review and approval under the National Environmental Policy Act (NEPA), mandated that the EIS documents would be prepared using existing data and information available at BLM Field Offices and from other sources. Consequently, significant emphasis was placed on obtaining comments from the public at the outset of the project; comments on the analysis in this DEIS will be considered as valuable and important information as well.

1.2 AREA OF CONSIDERATION

Riparian habitats constitute a small but critical percentage of lands administered by the BLM in New Mexico. The four figures at the end of this chapter provide a good understanding of the riparian habitats under BLM jurisdiction in context with the total surface lands administered by the Taos Field Office.

Figure 1.1 shows the location of the Taos Field Office in relation to the rest of New Mexico; Figure 1.2 shows the distribution of riparian habitats under the jurisdiction of the BLM in the Taos Field Office; Figure 1.3 shows the major physiographic features in the Taos Field Office area; and Figure 1.4 shows the land management jurisdiction of the Taos Field Office. Table 1.1 summarizes the existing situation regarding riparian areas under BLM jurisdiction in the Taos Field Office. It is important to note that this EIS does not include riparian areas within the Rio Grande and Rio Chama watersheds that are addressed in *The Rio Grande Corridor Proposed Plan and Final EIS* (BLM 1998a) or in the Rio Chama Management Plan (U.S. Forest Service et al. 1990).

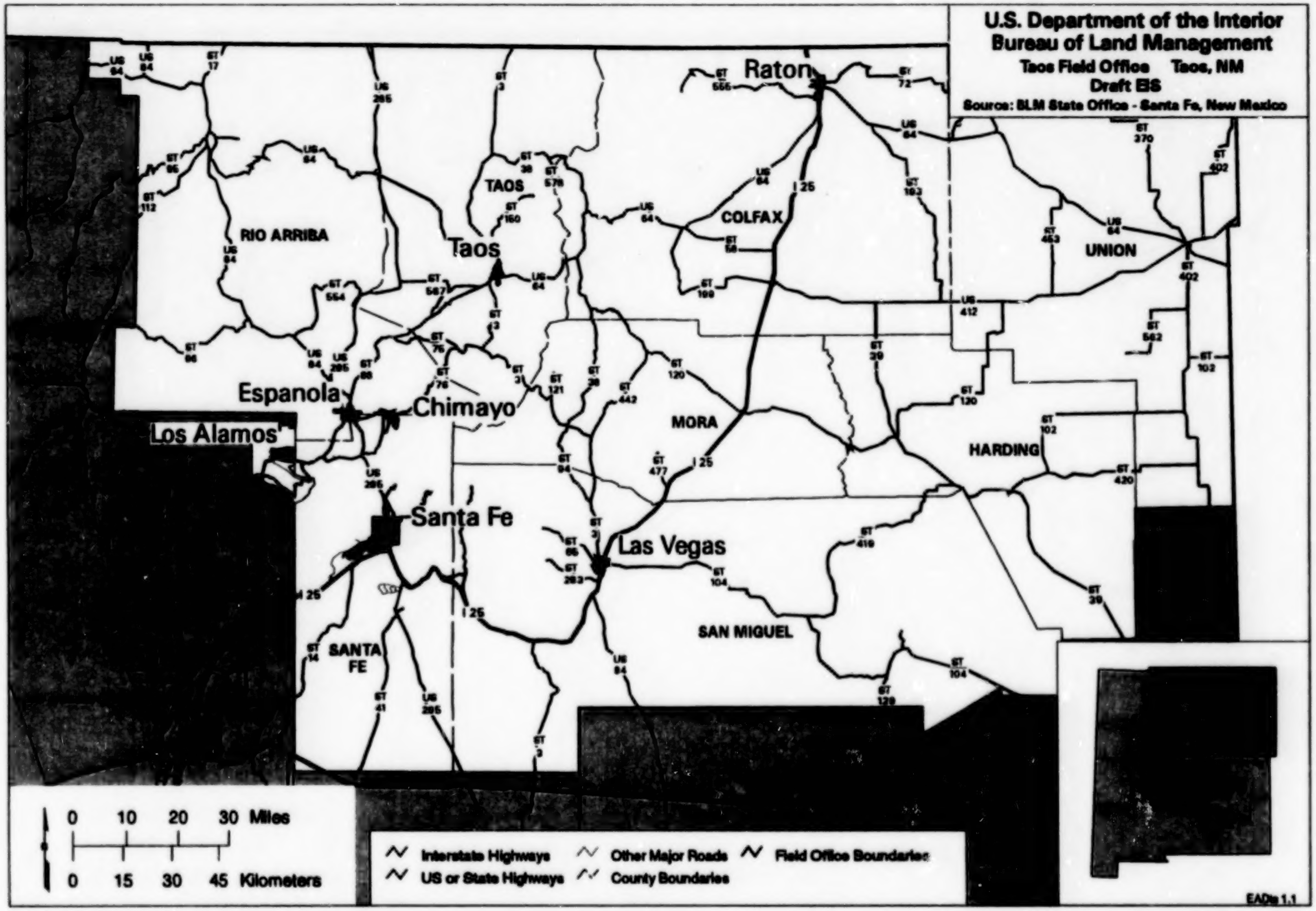
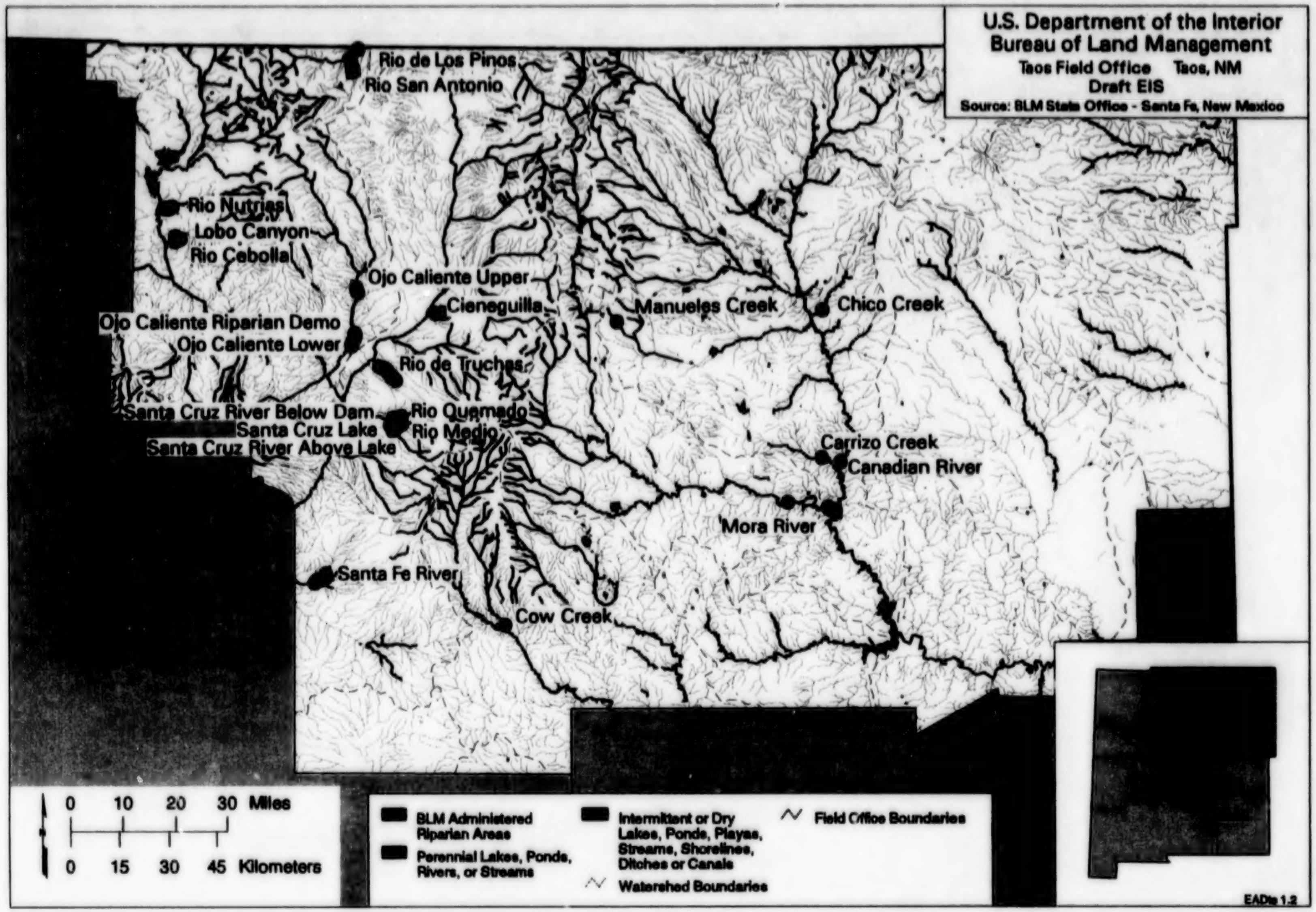


FIGURE 1.1 Taos Field Office Counties, Communities, and Roads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Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
Rio de Los Pinos
Rio San Antonio
Rio Nutrias
Lobo Canyon
Rio Cebolla
Ojo Caliente Upper
Cieneguilla
Manueles Creek
Chico Creek
Ojo Caliente Riparian Demo
Ojo Caliente Lower
Rio de Truchas
Santa Cruz River Below Dam
Rio Quemado
Santa Cruz Lake
Rio Medio
Santa Cruz River Above Lake
Carrizo Creek
Canadian River
Mora River
Santa Fe River
Cow Creek
0 10 20 30 Miles
0 15 30 45 Kilometers
BLM Administered Riparian Areas
Perennial Lakes, Ponds, Rivers, or Streams
Intermittent or Dry Lakes, Ponds, Playas, Streams, Shorelines, Ditches or Canals
Watershed Boundaries
Field Office Boundaries
EADIs 1.2

FIGURE 1.2 Taos Field Office Riparian Areas

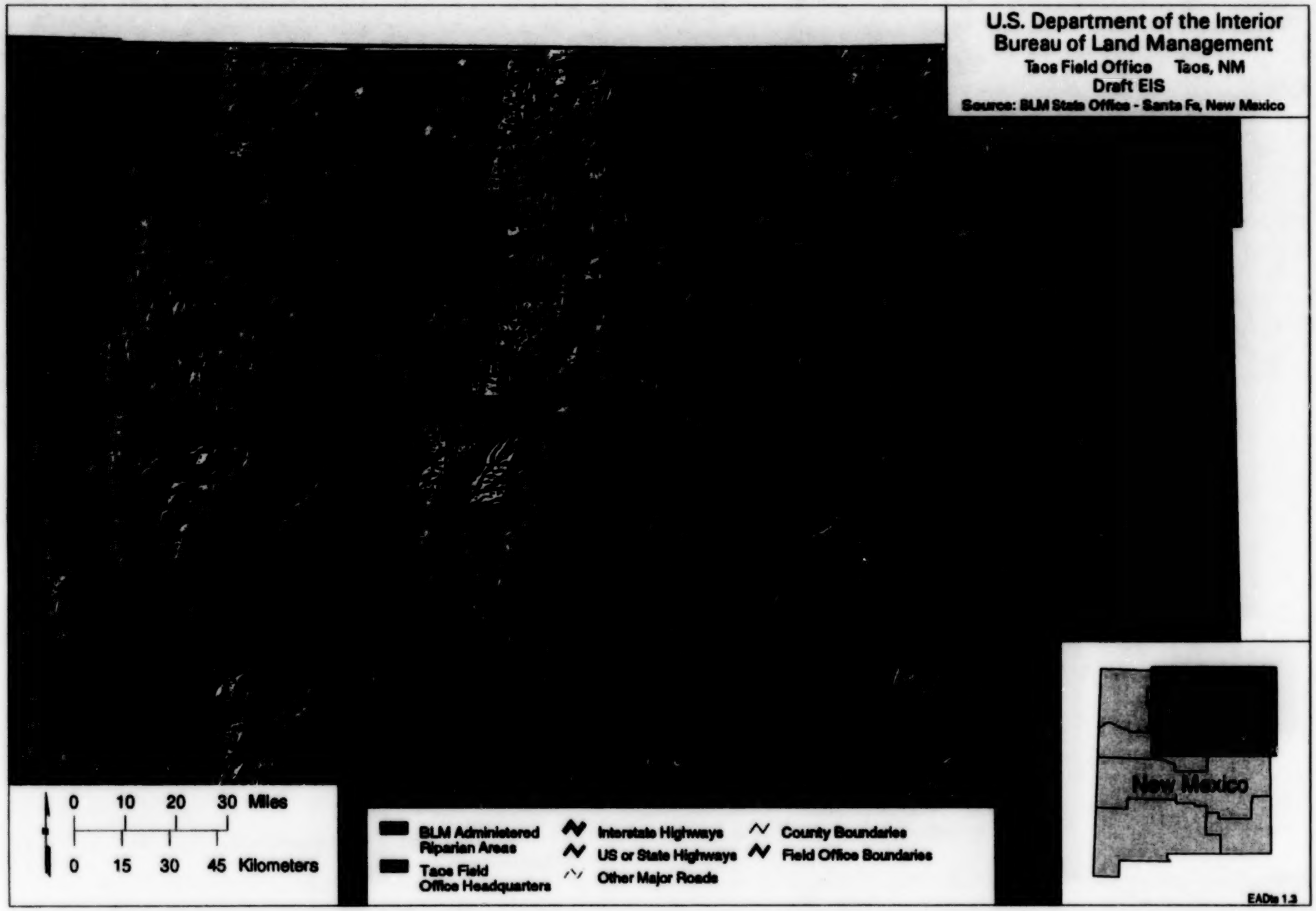
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
0 10 20 30 Miles
0 15 30 45 Kilometers
BLM Administered Riparian Areas
Taos Field Office Headquarters
Interstate Highways
US or State Highways
Other Major Roads
County Boundaries
Field Office Boundaries
New Mexico
EADts 1.3

FIGURE 1.3 Major Physiographic Features in the Taos Field Office Area

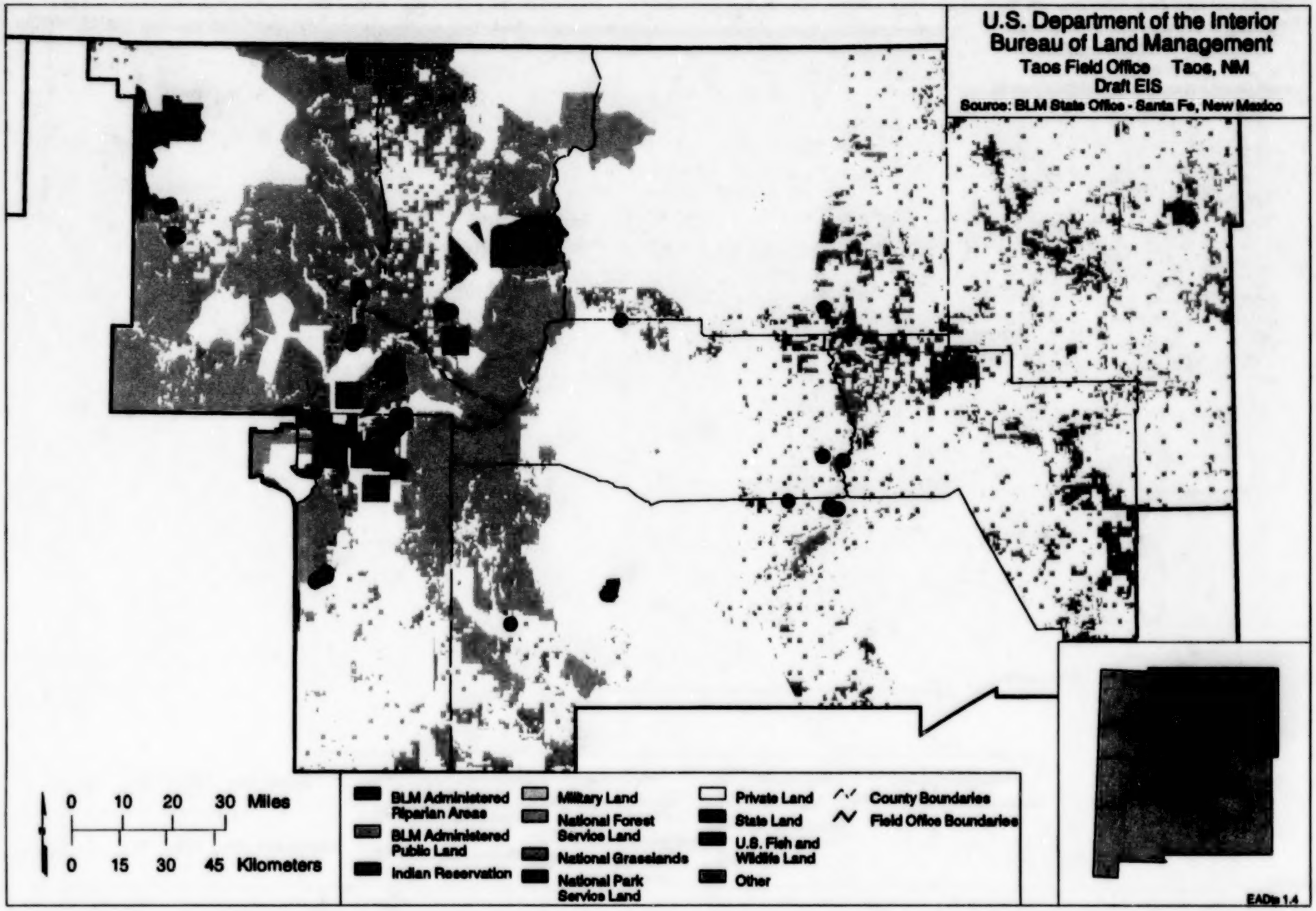
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
0 10 20 30 Miles
0 15 30 45 Kilometers
BLM Administered Riparian Areas
BLM Administered Public Land
Indian Reservation
Military Land
National Forest Service Land
National Grasslands
National Park Service Land
Private Land
State Land
U.S. Fish and Wildlife Land
Other
County Boundaries
Field Office Boundaries
EADis 1.4

FIGURE 1.4 Taos Field Office Land Status

TABLE 1.1 Taos Field Office Riparian Areas

Riparian Area	Length [miles] (Area [acres])	Type	Current Use	Threatened and Endangered Species[a]	Condition[b] (Date)	General Management Guidelines[c]	Specific Management Activities
Canadian River	1.0 (36.3)	Perennial stream	ORV; grazing	ARS, BE, PF	NF (1994)	1	
Carrizo Creek	0.5 (16.0)	Perennial stream	ORV; grazing; trespass grazing	ARS, BE, PF	NF (1994)	1	
Chico Creek	1.0 (1.5)	Perennial stream	ORV; grazing	None	Fair (1989)	1	
Cieneguilla	4.2 (33.1)	Perennial stream	No evidence of use	None	NF (1994)	1	
Cow Creek	1.0 (1.8)	Perennial stream	Grazing	None	FAR (1994)	1	
Lobo Canyon	0.8 (1.4)	Intermittent springs	No evidence of use	PLT SWF	FAR (1997)	1, 2	Fenced in 1998
Mora River	1.5 (36.3)	Perennial stream	Grazing	ARS, BE, PF	NF (1994)	1	
Manueles Creek	0.5 (5.5)	Perennial stream	No evidence of use	None	PFC (1994)	1	
Ojo Caliente Rip. Area Demonstration	1.25 (325.0)	Perennial stream	ORV; No grazing allowed	PLT SWF	Poor (1988)	1, 2	Fenced in 1987
Ojo Caliente Upper	1.3 (23.2)	Perennial stream	-	PLT SWF	Unknown	1, 2	
Rio Cebolla	2.3 (8.3)	Perennial stream	ORV; grazing	PLT SWF	PFC (1994)	1, 2	Fence on east side of riparian area
Rio de los Pinos	5.8 (77.3)	Perennial stream	ORV; fishing; grazing	PLT SWF	FAR (1994)	1, 2	
Rio Medio	2.75 (36.5)	Perennial stream	Grazing	None	FAR (1994)	1	
Rio Nutrias	2.5 (12.5)	Perennial stream	No evidence of use	None	FAR (1994)	1	
Rio Quemado	3.0 (32.8)	Perennial stream	ORV; grazing	None	PFC (1994)	1	
Rio San Antonio	13.2 (120.1)	Perennial stream	Grazing	None	FAR (1994)	1	Watergaps installed 1995
Rio de Truchas	7.5 (1033.0)	Intermittent stream; perennial spring	ORV; grazing; sand and gravel mining	PST SWF	FAR (1994)	1, 2	Winter grazing only; closed to mining 1994

TABLE 1.1 (Cont.)

Riparian Area	Length [miles] (Area [acres])	Type	Current Use	Threatened and Endangered Species[a]	Condition[b] (Date)	General Management Guidelines[c]	Specific Management Activities
Santa Cruz Lake	1.0 (135.0)	Reservoir	ORV; no grazing; recreation	None	Unknown (1994)	1, 3	
Santa Cruz River, Above Lake	1.0 (9.0)	Perennial stream	Grazing; hiking; fishing	PLT SWF	PFC (1994)	1, 2, 3	Grazing excluded 1998
Santa Cruz River, Below Dam	1.0 (27.3)	Perennial stream	ORV; grazing	None	FAR (1994)	1, 3	
Santa Fe river	6.0 (32.7)	Perennial stream	Trespass grazing	PLT SWF	NF (1994)	1, 2	

[a] PLT SWF = potential long-term southwestern willow flycatcher habitat; PST SWF = potential short-term southwestern willow flycatcher habitat; ARS = habitat for Arkansas River shiner; BE = habitat for bald eagle; PF = habitat for peregrine falcon.

[b] FAR = Functional – At Risk; NF = Nonfunctional; PFC = Proper Functioning Condition.

[c] 1 = *Taos Resource Management Plan* (BLM 1988); 2 = *Southwestern Willow Flycatcher Management Plan* (BLM 1998c); 3 = *Santa Cruz Lake Recreation Area Management Plan* (BLM 1989).

Source: BLM files.

2 ALTERNATIVES

2.0 INTRODUCTION

Section 2 presents alternatives under consideration for restoring and protecting riparian habitats on public lands managed by BLM in the Taos Field Office. These alternatives are the Current Management Alternative (No Action Alternative), Adaptive Management Alternative (Preferred Alternative), and Grazing Management Alternative. When the alternatives are being reviewed, it is important to keep in mind that while riparian habitats are critical ecological resources, the land area occupied by riparian habitats is very small in relation to the total land administered by BLM. In addition, the individual riparian areas under Taos Field Office jurisdiction are often a small part of a larger area under other jurisdictions where BLM has no management responsibility or authority. Each alternative applies to a management strategy for the aggregate of all riparian areas under BLM jurisdiction in the Taos Field Office, with the exception of those riparian areas in the Rio Grande and Rio Chama watersheds that are included in *The Rio Grande Corridor Proposed Plan and Final EIS* (BLM 1998a) and the Rio Chama Management Plan (U.S. Forest Service et al. 1990). Other land management activities will continue within the Taos Field Office regardless of which alternative is selected for the management of riparian areas and to the extent that they are not inconsistent with decisions affecting riparian habitat restoration and protection.

2.1 DESCRIPTIONS OF ALTERNATIVES

The descriptions of the alternatives that follow provide a general picture of how the Taos Field Office would manage riparian habitats under each strategy.

2.1.1 Alternative 1: Current Management

Under the Current Management Alternative (No Action Alternative), the Taos Field Office would continue to manage riparian areas in accordance with applicable BLM guidance with the objective of restoring and protecting riparian ecosystems in the context of authorizing other land management activities. This alternative is the No Action Alternative required for a NEPA analysis. Current management has already improved some riparian areas by removing domestic livestock either completely or during the growing season, as well as by implementation of other management practices.

Current management activities in the Taos Field Office are based on a set of plans and activities noted in Table 1.1. The current plans and activities derive from those aspects of BLM policy and guidance for riparian-wetland area management that seek to protect riparian habitat from potential adverse effects of other authorized uses of the land (BLM Manual Section 1737; BLM 1992a). Within the Taos Field Office, the policy and guidance on riparian habitats is usually applied in the form of stipulations or permit conditions when other uses are authorized for the public lands. For example, livestock grazing may be limited in riparian areas by location, season of use, or numbers of animal to protect riparian habitats; mineral developers may be precluded from locating facilities in or adjacent to riparian areas; and utility right-of-way permits may have prescribed special conditions against any activities that would impair riparian function. In addition, authorization for other uses of the land may require actions, such as water development, vegetation manipulation, bank stabilization, or other measures to restore or protect riparian habitats, as a condition of approval. Finally, current management may also undertake actions specifically designed to restore or protect riparian habitats as a specific Taos Field Office initiative. For example, field inventories have been conducted to determine the condition of riparian habitats, or specific vegetation control and management projects have been completed within current budget and staffing levels (see Table 1.1).

Current management activities are documented in a number of reports and files produced by the Taos Field Office. Many of those reports contain riparian habitat information or management as a secondary outcome in support of a broader land management objective. These reports are listed as follows:

- The site-specific information currently used to manage a number of riparian areas is found in the files of the Taos Field Office in the form of *Field Data Recording Sheets for RMP/Riparian SMA Decision Data*. These sheets have been used by Taos Field Office staff to record a broad range of environmental and management data, as well as assessments of riparian condition and recommendations for changes in management strategies.
- The current management plan for the Santa Cruz Lake Recreation Area (BLM 1989) contains information on the history of the reservoir, its uses, and the nature of its riparian habitat—the latter including data on terrain, general ecology, climate, soils and geology, vegetation, and wildlife. Associated riparian areas include the Santa Cruz River, Above Lake, and the Santa Cruz River, Below Dam.
- Certain characteristics of the Ojo Caliente riparian area are described in the management plan for Allotment No. 505 (BLM n.d.c.). Much of the information on the riparian area emphasizes use activities (e.g., grazing, hunting, hiking) and their management, although wildlife, vegetation, and cultural resources also are described briefly. The management plan for the Sebastian-Martin Grant allotment (BLM 1997a) also provides a condensed description of selected characteristics of a riparian area including the Rio de Truchas. Included in the latter plan is information on use, management, and wildlife.
- Another published source of information on a particular riparian area is the coordinated resource management plan (CRMP) for the La Cienega Area of Critical Environmental Concern (ACEC) (BLM 1995). Although not revealed in its title, the focus of that document includes the Santa Fe River riparian area. The report provides information supporting the expansion of the La Cienega ACEC. Resource values associated with the ACEC are cultural, wildlife, and riparian.
- The *Proposed Taos Resource Management Plan and Final Environmental Impact Statement* (BLM 1987) provides general land management guidance. However, the resource management plan (RMP) does not make specific recommendations for riparian habitat management. The final RMP was issued a year later (BLM 1988). It included information on the general environment and general management and use guidelines, but also lacked specificity regarding riparian habitat management as a specific Field Office activity.
- Much of the documentation on the southwestern willow flycatcher for the region administered by the Taos Field Office ultimately concerns the Rio Grande corridor, where that species has

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been documented (e.g., Southwest Center for Biological Diversity 1998; BLM 1998c). These documents contain important information on southwestern willow flycatcher habitat, noting that many of the riparian areas in the Taos Field Office-administered region are potential habitats for this species in the short or long term (BLM 1997).

- A final source of management guidance on the riparian habitats is the data pertaining to the Rio Chama and Rio Grande corridor. Although these areas are excluded from this EIS, because of geographic proximity and various ecological similarities with other riparian habitats, discussions of management activities in these planning activities provide useful background (types of wildlife and vegetation encountered, management considerations, etc.) for the current document, including:
    - The management plan for the Rio Chama [U.S. Department of Agriculture (USDA) 1990a-b] (also see BLM 1986b) provides both biological and management (emphasizing recreation) insights for that part of the river constituting the management area;
    - The assessment of Rio Chama stream flow (BLM 1992b), which presents detailed data on stream flow, an evaluation of its effect on aquatic ecology, and the functioning of the system of stream channels, dams, and reservoirs that affect flow (see also BLM 1994b, n.d.b.);
    - The evaluation for the Rio Chama Canyon plan (BLM n.d.b.), which provides information on recreation along the river and discusses the presence of bald eagles in the management area;
    - The bald eagle survey of the Coyote Ranger District of the Santa Fe National Forest (USDA 1988a), also documenting the presence of this species in the Rio Chama area;
    - The management plan for Peregrine Falcon Site U-16/U-17 (USDA 1988b), which describes the presence of this species in the Rio Chama area;
    - *The Rio Grande Corridor Proposed Plan and Final EIS* (BLM 1998a), providing a range of general data that are not clearly associated with specific sections of riparian habitat along the long management corridor;
    - The Rio Grande corridor biological assessment (BLM 1997a), which catalogues wildlife;
    - Two Rio Grande Valley water quality assessments, providing information on trace elements and organic compounds in bed sediment and fish tissue (Carter 1997), and data on nutrients, suspended sediment, and pesticides (Anderholm et al. 1995); and the classification of Rio Grande corridor riparian vegetation communities (Durkin et al. 1995).

2.1.2 Alternative 2: Adaptive Management

Under the Adaptive Management Alternative (the Preferred Alternative), the Taos Field Office would assign highest priority to implementing those management practices identified in current BLM management guidance to restore and protect all riparian habitats under BLM jurisdiction. This process would require a specific focus on riparian management, and decisions regarding other land management activities would be constrained to limit or prevent any adverse impact on riparian areas.

Application of the Adaptive Management Alternative represents a proactive approach that seeks to plan and implement strategies for restoring and protecting riparian habitats on the basis of a set of activities intended to achieve measurable improvement of riparian function. The management actions would be implemented irrespective of other public land administrative actions or functions. Riparian management would receive staffing and budget resources independent of other Taos Field Office business requirements or work tasks. This alternative is based on the concept that riparian habitats are critical elements in the landscape and that specific management actions are necessary to enable them to function at their potential. BLM policy, direction, and guidance are specifically formulated to accomplish this objective and prescribe a set of comprehensive practices for riparian-wetland management. Compared with the Current Management Alternative, the Adaptive Management Alternative seeks first to do what is necessary to ensure the restoration and protection of riparian areas and then to permit those other uses to the extent that they are compatible with the preservation of riparian resources.

Implementation of adaptive management practices would involve the following basic procedures:

(1) Survey and analyze riparian conditions,

(2) Use survey results to describe a desired future condition and identify appropriate management actions,

(3) Implement management actions,

(4) Monitor the success of the management actions, and

(5) Modify the management actions, if necessary, on the basis of the monitoring results.

The ordered sequence of these procedures describes an adaptive management approach that provides a means to change management activities when monitoring data show that current actions are no longer required or when current actions are not resulting in achievement of a desired restoration or enhancement goal outlined in item 2 above. A guiding principle is that all information is collected and analyzed to judge success in achieving (1) the endpoints associated with proper functioning condition and (2) a desired vegetation composition and structure. It should be noted that when adaptive management practices are being implemented, the development of management actions is a decision outcome derived from the results of baseline riparian area surveys and analyses.

The specific steps to implement Alternative 2, Adaptive Management, are derived from the BLM Technical Report Series 1737. For purposes of implementing an adaptive management approach, the following series of tasks would be conducted.

Task 1 – Survey and Analyze Riparian Conditions: Baseline data collection and analysis would follow the guidelines contained in BLM Technical Report 1737-15 (BLM 1998b). The Taos Field Office would develop an implementation plan (including schedule, budget, and quality control measures) and conduct all field surveys to determine the current condition of each designated riparian area. The outcome of this action would be a written determination (available to the public) of the status of riparian habitat conditions, including natural ecological systems and human-caused conditions. As a part of the summary and analysis of riparian conditions, the Taos Field Office would use the findings of previous riparian surveys and data collection efforts.

Task 2 – Define a Desired Future Condition and Required Management Actions: Results of the survey and analysis of riparian habitats conducted by the Taos Field Office would be used to define the desired future condition of individual riparian segments administered by the BLM and identify the specific management actions needed to achieve that condition. The desired future condition that is defined would take into account (1) the ability of the area to develop and support threatened and endangered species habitat, (2) potential vegetation communities that could develop at the site, (3) erosion and deposition conditions, (4) current activities that may be detrimental to achieving proper functioning condition, (5) the characteristics of the surrounding land use, (6) potential use conditions that could be accommodated at the site, and (7) management actions needed to restore and/or protect the long-term ecological condition of the riparian segments, wetlands, or seeps. Included in the definition of the desired future condition would be a list of measurable endpoints that can be monitored to determine the status of the riparian ecosystem over time. Finally, a set of management goals would be developed to assist in determining the required budget and staffing needs to implement the riparian habitat management plan.

Task 3 – Implement Management Actions: Table 2.1 lists the types of management activities that could be implemented by the Taos Field Office, depending on the findings developed under the baseline data collection and written baseline determination. The activities cited represent summaries of management techniques outlined in BLM Technical Report 1737-6 (BLM 1992a). In addition, the Taos Field Office would continue to implement current management activities that are consistent with the requirements identified under Task 1, Survey and Analyze Riparian Conditions.

Management activities would also include implementing specific grazing management protocols that would be established for each riparian area on the basis of guidance provided in BLM Technical Report 1737-14 (BLM 1997). The protocols, which would be implemented for all allotments that include riparian habitat, would include one or more of the following grazing treatments:

- *Riparian Pasture*: Establish a combination of upland and riparian vegetation that will be managed as one unit within a larger allotment.
- *Winter Grazing*: Allow limited grazing in riparian areas when the vegetation is dormant.
- *Long-Term Rest*: Eliminate grazing from riparian areas for a period of 10 years. After the 10-year period, collect vegetation and erosion data to determine if riparian pastures or winter grazing may be established. Additional monitoring during the 10-year period would be conducted to determine the status of other riparian endpoints, such as endangered species habitat or soil erosion conditions.
- *Total Exclosure*: Permanently exclude livestock use.

TABLE 2.1 Riparian Area Management Practices

Practice	Objective	Comment
Fencing	Isolate degraded habitats	Consider big-game migration, public access, beaver activity, falling trees, and vehicles
Prescribed burns	Modify vegetation communities	Primarily for upland areas; avoid areas of special concerns (endangered species)
Forestry practices	Improve vegetation communities	Cover or canopy manipulation of coniferous stands, woody debris, or slash management
Vegetation plantings	Reestablish native communities	Cuttings work well for woody vegetation; make sure end is below water table; transplant in enhanced soil; seeding is done fall-spring; rake after application
Opportunities from mineral activities	Mitigate mineral exploitation	Reclamation to utilize spoil runoff or drainage; riparian habitat development in association with evaporation ponds; water spreaders to collect increased runoff from road construction
Structures	Control erosion	Riprapping banks, gradient restoration, water energy-transfer structures, gully plugs, spring developments, removal or modification of channelization structures, etc.
Beaver complex cycling	Transform pioneer woody vegetation into riparian community	Cycling of beaver complexes; special management to maximize vegetation regrowth rates; maximize initial construction population followed by reductions for maintenance levels
Bank stabilization	Accelerate soil and water conservation efforts	Anchoring green trees (or discarded Christmas trees) into banks; log structures (10 in. -12 in. diam.) at base of bank; gabions (must exceed size of net) or riprap (24 in.)
Recreation planning	Protect, manage, and improve habitats	Maintain a presence; retain vegetation; locate sites outside of riparian areas; prohibit vehicles from stream access; plant dense vegetation to screen and reduce use of sensitive areas; install signs; designate sites within riparian areas
Road relocation, construction, and maintenance	Protect, manage, and improve habitats	Locate outside of riparian area; prohibit vehicles from leaving roads; install signs; minimize impact to streambank and vegetation; revegetate disturbed areas; design and maintain culverts to allow fish passage and free debris flow; haul waste material away
New well pad construction	Protect, manage, and improve habitats	Locate outside of riparian area and 100-year floodplain for ephemeral washes
Public education	Provide information to public land users on protection methods	Develop environmental education and interpretative displays designed to modify visitor or user behavior in or adjacent to riparian areas

Source: BLM (1992a).

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Task 4 – Monitor Success of Management Actions: The Taos Field Office would develop a written monitoring plan as part of the habitat management plan. The monitoring plan would specify schedule, data collection protocols, measurement endpoints, and management outcomes for all riparian habitats. The monitoring plan would use guidance material in BLM Technical Reports 1737-7 (BLM 1992c), 1737-8 (BLM 1993a), 1737-11 (BLM 1994a), 1737-12 (BLM 1996a), 1737-14 (BLM 1997b), and 1737-15 (BLM 1998b). The results would be used to determine the success of the management actions and as a basis for suggesting any necessary changes in the management actions. The monitoring plan would include procedures that enable the Taos Field Office to quantify the following conditions:

- Desired condition of riparian vegetation, with an estimate of vegetation structure and species composition;
- Erosion and deposition conditions within the riparian area;
- Status of threatened and endangered species;
- Threats and opportunities from surrounding land uses;
- Status of domestic livestock grazing;
- Status of management actions taken to date;
- Wildlife use of the riparian area;
- Recreational use of the riparian area;
- Success of public education tools to effect changes in human use of riparian areas; and
- Estimated time remaining to meet stated protection and enhancement goals for the riparian habitat developed under Task 1.

***Task 5 – Modify Management Actions*:** Implementation of an adaptive management approach requires a commitment to modify riparian habitat management activities if monitoring shows that the proposed desired future condition outlined in Task 2 would not be achieved under current management activities. Provision for monitoring and then modifying management activities if necessary builds positive feedback capabilities into the habitat management plan. In addition, modifications potentially allow use conditions to change as (1) riparian habitat conditions improve (proper functioning condition) and (2) vegetation conditions indicate that plant community processes have become stable, pointing to positive future conditions (e.g., succession, elimination of non-native species, reproduction of desired native species).

2.1.3 Alternative 3: Grazing Management

Under the Grazing Management Alternative, the Taos Field Office would eliminate grazing by domestic livestock in riparian areas by modifying grazing allotments to exclude riparian areas. For each allotment affected, this provision would include changing the description of the allotment, installing fences or other physical barriers to exclude livestock from riparian areas, and, if appropriate, adjusting the number of livestock permitted in a modified allotment. This alternative, if selected, may require the amendment of the Taos RMP.

The Grazing Management Alternative is a response to the conventional wisdom that domestic livestock grazing is an inappropriate use of riparian areas and should not be allowed

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to occur at any time. Because there is considerable literature to support this contention and there is sufficient evidence that elimination of livestock grazing from riparian areas would result in an improvement of conditions in those areas, Alternative 3 needs to be considered in the current analysis. During the scoping process, application of grazing controls was the single most consistent advice that BLM received from the public regarding the protection of riparian habitat.

Many of the riparian areas under the management of the Taos Field Office are within grazing allotments, and grazing is currently allowed (managed or unmanaged) in a number of these areas (Table 1.1). Under Alternative 3, the Taos Field Office would develop management actions that would remove domestic livestock from these riparian areas.

2.2 PREFERRED ALTERNATIVE

The preferred alternative for riparian habitat management in the Taos Field Office area is Alternative 2, Adaptive Management.

2.3 NEED FOR FURTHER NEPA ANALYSIS

Management actions described and analyzed in this document and included in the Record of Decision for implementing riparian habitat management within the jurisdiction of the Taos Field Office will have met the requirements for NEPA analysis. Additional NEPA analysis would be required for any management action that goes beyond the scope of this document. To the extent possible, any further analysis that would be required would tier from this EIS.

2.4 INTERRELATIONSHIPS

States, localities, and the federal government have in place a number of powers, statutes, and programs that may work to protect riparian areas. Taken together, these programs form a mosaic of protection, but few programs have riparian protection as an objective, leaving the riparian zone to diminish in size and productivity (Lamb and Lord 1992). To the extent that federal laws and executive orders would apply to any permits or developments that would be required in order to implement the actions described in this document, consultation with the agencies responsible for administering those laws and orders would be necessary.

Federal law and policies that affect the riparian zone include the following (Lamb and Lord 1992):

- Protection of Wetlands (Executive Order 11990);
- Floodplain Management (Executive Order 11988);
- Fish and Wildlife Coordination Act;
- Clean Water Act;
- Federal Power Act;
- Food Security Act;
- Migratory Bird Treaty Act;
- Habitat easements;
- Wild and Scenic Rivers Act;
- Federal reserved rights;
- Federal property management, access, and use permits (for the BLM, these are addressed in the Federal Land Policy

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and Management Act, Taylor Grazing Act, Public Rangelands Improvement Act, and BLM policy statements); and

- Endangered Species Act.

Some of the more relevant of these measures are briefly discussed below.

Endangered Species Act: The Endangered Species Act (ESA) specifies consultation with the U.S. Fish and Wildlife Service (USFWS). The BLM has initiated this consultation and expects to complete it before publication of the Final EIS. The final compliance documentation will be included in the Final EIS.

Clean Water Act: The U.S. Army Corps of Engineers administers Section 404 of the Clean Water Act (CWA), which addresses wetlands. Although no actions that would require Section 404 review are included in the scope of this EIS, any future riparian habitat management proposals requiring such review would trigger the need for additional NEPA documentation. In that case, any future NEPA document would describe the project's components, identify the type and amount of wetlands and other waters affected by each alternative, describe anticipated impacts, and discuss mitigation measures that could minimize adverse impacts to these resources. Section 313 [33 *United States Code* (U.S.C.) §1323 (1994)] of the CWA places directly on federal agencies, including the BLM, the responsibility to comply with all federal, state, and local requirements for water-pollution control. Unlike Section 401, Section 313 explicitly applies to "runoff" as well as "discharge" of pollutants. Thus, any BLM grazing permit that authorizes grazing that causes violations of water-quality standards may be subject to legal challenges under Section 313 (Feller 1998).

Federal Land Policy and Management Act: Under the Federal Land Policy and Management Act of 1976, also known as the BLM Organic Act, the BLM is required to manage the lands within its jurisdiction under the principle of "multiple use" (43 U.S.C. §§ 1701, 1761-1771 [1994]). Multiple use is defined in the Act as the "combination [of uses] that will best meet the present and future needs of the American people." The definition prohibits "permanent impairment of the productivity of the land and the quality of the environment," and requires that consideration be given to "the relative values of the resources" (Feller 1998).

The Federal Land Policy and Management Act directed that BLM public lands be retained in federal ownership, their resources be inventoried, their use be determined through a land-use planning process, and they be managed under principles of multiple use and sustained yield. The Act directed that one-half of the grazing fee receipts (see below) be used annually by the BLM for on-the-ground range rehabilitation, protection, and improvement projects [U.S. General Accounting Office (GAO) 1988].

Taylor Grazing Act: Enacted in 1934, the Taylor Grazing Act is the basic legislation governing the BLM's management and protection of public rangelands. The Act directs the Secretary of the Interior to stop injury to public range by preventing overgrazing and soil deterioration; to provide for its orderly use, improvement, and development; and to stabilize the livestock industry dependent upon the public range. The Act also authorized the Secretary to issue grazing permits and directed that a fee be charged for grazing (GAO 1988).

Public Rangelands Improvement Act of 1978: The Public Rangelands Improvement Act directed the Secretaries of Agriculture and the Interior to maintain on a continuing basis an inventory of range conditions and records of trends in range conditions, authorized additional range improvement funding, and prescribed the development and periodic review of allotment management plans (AMPs) tailored to improving range conditions. The Act also authorized an Experimental Stewardship Program to explore innovative ways to provide incentives to improve range conditions (GAO 1988).

2.5 ALTERNATIVES AND ISSUES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Comments received in the public scoping process for this EIS indicated that recreation use and mineral development could affect riparian habitats. However, it was determined that neither of these activities constituted a significant issue compared with concerns about domestic livestock grazing, and that both recreation and mineral development can be managed effectively within each of the three alternatives selected for detailed analysis in this EIS.

The scopes of the proposed alternatives do not involve Comprehensive Environmental Response, Compensation, and Liability Act/Resource Conservation and Recovery Act (CERCLA/RCRA) or air quality issues; therefore, these issues do not merit analysis and impact evaluation.

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3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.0 INTRODUCTION

The Taos Field Office lies in northeastern New Mexico and includes land in Colfax, Harding, Los Alamos, Mora, Rio Arriba (eastern portion), San Miguel, Santa Fe, Taos, and Union Counties (Figure 1.1). It encompasses about 24,000 square miles of mixed land ownership, including about 524,000 acres of public surface estate and about 1,800,000 acres of subsurface minerals managed by BLM. Most people live in the communities of Santa Fe, Los Alamos, Las Vegas, or Taos, all located in the western half of the region.

Table 3.1 describes some demographic characteristics of the counties located in the Taos Field Office. The counties included in this DEIS include all of Colfax, Harding, Los Alamos, Mora, San Miguel, Santa Fe, and Taos Counties, and the eastern half of Rio Arriba County.

These counties are ethnically diverse. In Mora, Rio Arriba, San Miguel, and Taos Counties, the majority of the population is of Hispanic origin. In Arriba, Santa Fe, and Taos Counties, American Indians are a large minority group, constituting nearly 3% of the population in Santa Fe County and 15% in Rio Arriba County.

The county in the Field Office area with the largest population is Santa Fe County, with 98,928 people. The population of Santa Fe County is almost three times larger than the next largest county, Rio Arriba (34,365), and more than 100 times larger than the smallest county, Harding (987). Los Alamos and Santa Fe are the most urbanized counties, with 97% and 72%, respectively, of their populations residing in urban areas. In contrast, Harding, Mora, and Union Counties do not contain urban areas. In each of these three counties, at least 15% of the population lives on farms. In the other counties, however, the percentages of the rural populations that live on farms are very small. Most of these rural populations reside in small communities.

The mean household income is highest in the more urbanized counties of Los Alamos ($54,801) and Santa Fe ($29,403). All of the other counties have mean household incomes below the state average, ranging from $12,993 in Mora County to $20,800 in Colfax County.

This section discusses the 20 riparian areas shown in Figure 1.2 that are managed by the Taos Field Office and that are outside the scope of *The Rio Grande Corridor Proposed Plan and Final EIS* (BLM 1998a). The specific characteristics of each riparian area are summarized in Table 1.1 and are presented in more detail following a general description of the regional environment.

3.1 CLIMATE

The area within the jurisdiction of the Taos Field Office occurs in two regional climatological areas in New Mexico — the Northern Mountains and the Northeastern Plains (BLM 1987). The general climatic classification throughout the entire region is semiarid. Precipitation varies seasonally and geographically. As much as half the annual precipitation in the region falls in the summer. Larger amounts of precipitation occur in the mountains and northern areas, averaging more than 22 inches annually compared to about 8 inches annually in the southern part of the region. Both the seasonality and spatial variability of precipitation provide management challenges. For instance, summer thunderstorms often cause considerable erosion along riparian areas. The two- to three-month dry period each spring and early summer reduces both surface and groundwater.

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TABLE 3.1 Urban, Rural, and Ethnic Characteristics of Counties in the Taos Field Office Area

				Rural								
County	Population	Households	Urban	Farm	Non Farm	White	Black	Amer. Ind.	Other	Persons of Hispanic Origin[a]	Employed in Agriculture	Household Income ($)
Colfax	12,925	4,961	7,372	415	5,138	10,735	38	80	2,072	6,057	386	20,800
Harding	987	396	0	219	768	781	6	6	194	451	132	19,020
Las Alamos	18,115	7,211	17,612	0	503	17,098	58	154	805	1,933	64	54,801
Mora	4,264	1,516	0	646	3,618	2,423	0	14	1,827	3,625	205	12,993
Rio Arriba	34,365	11,525	8,339	302	25,724	24,386	72	5,282	4,625	24,868	502	18,373
San Miguel	25,743	8,622	14,753	294	10,696	16,442	176	132	8,993	20,592	279	17,885
Santa Fe	98,928	37,787	71,238	231	27,459	79,672	574	2,611	1,6071	48,660	889	29,403
Taos	23,118	8,811	4,065	195	18,858	16,824	69	1,628	4,597	15,190	434	16,966
Union	4,124	1,625	0	773	3351	3966	0	51	107	1,349	409	18,227

[a] Includes anyone who reported being of Hispanic origin, regardless of race.

Source: U.S. Bureau of the Census (1990).

Consistent with the semiarid nature of this region, evaporation in most of the area is high and humidity is low. Relative humidity ranges from an average of about 65% at sunrise to about 30% in mid-afternoon — although afternoon humidity can drop to less than 20% during summer months and has been recorded as low as 4%.

Temperatures vary widely with the season, location, and elevation. Summer temperatures in lower elevations can exceed 100°F, while winter temperatures in higher elevations can fall well below 32°F. Neither maximum nor minimum temperatures have particularly severe impacts on resources in the region, as most wildlife and plants are adapted to survive in such conditions.

Winds tend to vary frequently in direction, being evenly distributed among all directions except the east (though east winds occasionally occur in association with summer thunderstorms). Prevailing wind direction tends to vary seasonally and determines the direction from which precipitation comes. Detailed information on prevailing wind direction in the region is available for Raton and Santa Fe. Temperature inversions, which rarely occur and are short-lived when they do, have been recorded for Española, Santa Fe, and Taos.

3.2 TOPOGRAPHY

The Taos Field Office area of jurisdiction features a widely varied topography, ranging from New Mexico's highest mountain, Wheeler Peak at 13,161 feet above sea level, to nearly level plains at lower elevations (Figure 1.3). The topography of the region is the result of sedimentary processes dating from Precambrian times followed by three major mountain-building events. Topographically, the region may be divided two different ways. One assigns portions of the area to the four physiographic provinces that occur in the southwestern United States: the Great Plains, southern Rocky Mountains, Basin and Range, and Colorado Plateau. The Great Plains portion of the region includes the Raton Section, the Pecos River Section, and the Southern High Plains Section, each characterized by generally flat plains and high plateaus. The southern Rocky Mountains include the Sangre de Cristos and the Brazos ranges, the broad volcanic plateau of the southern San Luis Valley, and the Rio Grande Gorge. The Colorado Plateau portion of the region comprises the Navajo Section, characterized by tablelands with broad valleys and local canyons in the San Juan Basin. Finally, the Basin and Range component of the region administered by the Taos Field Office consists of the Mexican Highland Section — scattered block-faulted mountain ranges separated by broad intermontane basins, as well as the narrow Rio Grande Valley.

The region can also be divided into three main geographic components (Mountain Region, East Central Plains Region, and Western Region) on the basis of topography and soils. The Mountain Region is the highest and coldest, occurring in the northern part of the region. The topography of this northern component includes steep canyons, mesa tops, foothills, and lava flows. Soils range from shallow to more than 5 feet thick, their textures varying from moderately coarse to fine. About 20% of the public land administered by the Taos Field Office occurs in the Mountain Region.

The public lands in the eastern portion of the Taos Field Office occur in the East Central Plains Region. This region features undulating to rolling uplands, smooth valleys, and closed basins. The Canadian River Gorge cuts through this region, its steep sides reaching 1,000 feet in height. Soils include shallow, cemented caliche horizons in undulating portions of the region; shallow to deep deposits in level to rolling uplands; and deep saline soils in the nearly level

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alluvial bottoms. About 10% of the public land administered by the Taos Field Office is in the East Central Plains Region.

The remaining public lands administered by the Taos Field Office are in the Western Region. This region is characterized by broad mesas, plateaus, and lava flows interspersed among deep canyons and dry washes. The Rio Grande cuts a 200- to 800-foot-deep canyon through the northern half of the Western Region. Soils vary between shallow, moderately fine-textured deposits on steep slopes; shallow to moderately deep, moderately coarse to medium textured deposits on mesa tops, lava flows, and plateaus; and shallow to deep, medium to fine textured deposits, augmented with cobbles and stones, in the floodplain. About 70% of the public land administered by the Taos Field Office is in this Western Region.

3.3 MINERALS

The Taos Field Office area contains a variety of mineral resources in each of three categories: leasable, locatable, and salable (BLM 1987). Although the majority of mineral resources occur on either private land or land administered by another government agency, a small amount occurs on land administered by BLM or in proximity to BLM-administered land (and thus potentially affecting it). Primarily because of the limited amount of these resources, the extraction of minerals has had only slight adverse impacts on riparian resources administered by the Taos Field Office.

The most important leasable mineral commodity in the region is carbon dioxide. Some of the largest sources of this commodity occur in this region (notably in the Bravo Dome unit in the eastern part of the Taos Field Office area). As of 1986, carbon dioxide was the only mineral resource whose development was increasing. Coal deposits in two fields on public lands administered by the Taos Field Office are partially controlled by BLM — the Raton Field in Colfax County and the Cerrillos Field in Santa Fe County. In 1986 no coal was being mined on public lands in the region. Oil, gas, and geothermal resources compose the third leasable mineral commodity in the Taos Field Office area. In 1986, several federal leases existed in the eastern portion of the Taos Field Office area, mostly for oil and gas. Production from any of the BLM leases at that time was very low.

Locatable minerals generally are of limited importance in the Taos Field Office area. Only one economic deposit of molybdenum is known, in northeastern Taos County, although tailings from other locatable mineral mining operations also have affected BLM-administered land. Three perlite mines were operating in the region in 1986, all located in northwestern Taos County. Each of these mines involved BLM-administered land to varying degrees. In 1986, no appreciable amounts of gold, silver, copper, tungsten, or base metals were being extracted from land administered by the Taos Field Office. However, one copper mine and one gold mine, both located in southern Santa Fe County, were operable and testify to the presence of these resources in the region. Similarly, there was no uranium, mica, or pegmatite being extracted from BLM-administered land in the region. Nevertheless, there remains a high potential for extracting certain locatable minerals in the Taos Field Office area.

The most important salable mineral administered by the Taos Field Office is volcanic cinder. Despite the large reserves of this material in northern New Mexico, only five deposits in 1986 involved BLM-administered lands. Two of these deposits occurred in northeastern Rio Arriba County, the remaining three occurring in northwestern Santa Fe County. The size of these deposits, consistent with the geological history of the region, suggests that continued production is likely. The other important salable minerals in the region are sand, gravel, and fill, all of which occur in large deposits, particularly along the Rio Grande Valley. Despite the size of these deposits, and substantial annual exploitation (35,000 cubic yards extracted annually) from BLM-administered lands, the amount extracted is quite small compared to that taken from private lands in the region.

3.4 HYDROLOGY

The Taos Field Office area lies primarily in two major surface water basins (BLM 1987) — the Rio Grande Basin (about 50% of the area) and the Arkansas White-Red River Basin (about 50% of the area) (Figure 1.2).

The Rio Grande Basin forms the main drainage basin for all of central New Mexico, stretching from the border with Texas and Mexico in the south to the border with Colorado in the north. Principal tributaries of the Rio Grande located in the basin include the Red River, Embudo Creek, and Rio Chama, all perennial throughout their length; and Rio Ojo Caliente, Pojoaque River, Santa Fe River, Santa Cruz River, and Galisteo River, which discharge into the Rio Grande intermittently. The Rio Grande Basin frequently is divided into several subareas. Four of these are pertinent for present purposes — the Upper Rio Grande Subbasin, which contains most of the Taos Field Office-administered land lying within the Rio Grande Basin, and the Pecos, Central-closed, and Middle Rio Grande Basins, each of which contains much smaller portions of the BLM-administered land.

The Upper Rio Grande Basin is the main water producing area in the Rio Grande Basin of New Mexico. Much of the surface water is snow pack runoff from the Sangre de Cristo, San Juan, and Jemez Mountain ranges, where precipitation is relatively high for this part of New Mexico and evapotranspiration relatively low. Flash flooding often accompanies spring and summer rains, when channels cannot accommodate short-term water volumes.

The San Juan-Chama Project diverts 150,000 acre-feet of water annually from the San Juan to the Rio Grande Basin. Since 1972, this diversion has increased the average annual flows in the Rio Chama and the Rio Grande below the mouth of the Rio Chama. The San Luis Valley Project, completed in the early 1990s, further increased the flows of the Rio Grande.

Water quality in the Rio Grande Basin generally is good, suitable for most designated uses (Anderholm et al. 1995; Carter 1997). Although relatively high concentrations of dissolved solids occasionally occur in the Rio Chama and Red River, average levels do not exceed established standards. Increased salt load in the Rio Grande has accompanied growing urbanization, mineral production, and the Colorado Closed Basin Project. Sedimentation remains the principal water quality problem in the Rio Grande Basin, impairing range and farmland use through reduced availability, interrupting irrigation systems, and reducing reservoir and stream capacity.

The Santa Fe Formation is the main aquifer in the Taos Field Office. Beneath the lava plateau west of the Rio Grande, andesite-basalt and alluvial sediments furnish an adequate supply of moderately hard water for domestic and livestock use. The main water table tends to occur 250 to 750 feet beneath the surface. Groundwater quality generally is good, and although moderately hard [with dissolved solids reaching the 1,000-3,000 parts per million (ppm) in some places], usually is adequate for most domestic and livestock uses. The development of groundwater on all the land administered by the Taos Field Office is under the jurisdiction of the New Mexico State Engineer.

The Arkansas-White-Red River Basin lies in the northeastern part of the Taos Field Office area. Although in total extent a much smaller basin than the Rio Grande Basin, the Arkansas-White-Red River Basin nevertheless contains the remaining approximately 50% of the Taos Field Office area. This basin is drained by the Canadian River and its tributaries: Purgatory River, Dry Cimmarron River, Corrizozo Creek, North Canadian River, and Carrizo Creek.

Surface water in the Arkansas-White-Red Basin is characterized by wide fluctuations in flow and little base flow, with significant peaks in June-August because of snow pack runoff combined with spring rains and summer thunderstorms. The quality of surface water was good to excellent in the late 1980s, although with indications of deterioration.

Groundwater in the Arkansas-White-Red River Basin tends to lie 200 to 500 feet beneath the surface and varies widely in quality, depending on the aquifer involved. Uses include domestic and livestock use, as well as irrigation. Groundwater in this basin often is difficult to obtain and as a consequence has not been developed extensively.

BLM riparian areas are affected by the activities and quality of the watershed, while the health of the riparian area would contribute to the present conditions of the watershed, depending on the size, structure and location of the riparian area in the watershed. A compilation of watershed information is given in Table 3.2.

The data for Table 3.2 are adapted from the Clean Water Action Plan, Unified Watershed Assessment (UWA) for the State of New Mexico (New Mexico Environment Department and Natural Resources Conservation Service 1998). The UWA is the product of local, state and federal agencies, tribes and pueblos, environmental organizations, industry representatives, and the public. The UWA report concluded that of the 83 U.S. Geological Survey (USGS) Level 8 watershed units in the state, 21 were classified as Watersheds in Need of Restoration, while 62 were classified as Watersheds with Insufficient Data to Make an Assessment.

In the data adapted from the UWA report, total maximum daily load (TMDL) miles and National Pollutant Discharge Elimination System (NPDES) permits are indicators of the amount of pollutant stress in the watershed. The presence of drinking water systems represents dependence on surface water quality for public health. The number of U.S. Army Corps of Engineers (COE) permits most likely correlates with the amount of current development in the watershed, while the number of USGS gauging stations is a source of important long-term trends. Together, these data describe the quality of surface water, the level of human development, and the level of public interest in a specific watershed.

3.5 LANDS

The Taos Field Office area encompasses about 24,000 square miles in nine counties in northeastern New Mexico, with approximately 564,000 acres of public surface land being managed by BLM (BLM 1987). Much of the administered land is concentrated along the Rio Grande Valley (in Rio Arriba, Santa Fe, and Taos Counties), while the remainder tends to be dispersed among small tracts — with about 3,000 separate parcels in all (about 0.05% of the total land area) under BLM administration. Land owned by, or under the jurisdiction of, other federal agencies (notably the

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TABLE 3.2 Selected Parameters for Watersheds That Contain Riparian Habitats Located in the Taos Field Office Area[a]

8-digit Hydrologic Units	River	Associated Riparian Areas	Area (square miles)	TMDL Segment (miles)/ Restoration Schedule (year)	Number of Causes for Non-Support	Number of NPDES Permits	Number of Water Supply Systems	Number of COE Sec. 404 Permits	Number of USGS Stations
Arkansas White-Red Region									
11080003	Upper Canadian	Canadian River, Carrizo Creek, Chico Creek, Manueles Creek	2048	23.1/NA	1	0		56	6
11080004	Mora	Mora River	1483	149/1999	5	1	0	64	5
Rio Grande Region									
13010005	Conejos	Rio de los Pinos, Rio San Antonio	243	48/NA	2	0		72	
13020101	Upper Rio Grande	Cieneguilla, Rio de Truchas, Rio Medio, Rio Quemado, Santa Cruz Lake	3109	234/2017	10	6	1	675	32
13020102	Rio Chama	Lobo Canyon, Ojo Caliente, Rio Cebolla, Rio Nutrias	3075	343/1999	8	2	3	423	5
13020201	Rio Grande-Santa Fe	Santa Fe River	1870	26/1999	4	3	1	328	6
Pecos River Basin									
13060001	Pecos Headwaters	Cow Creek	4276	277/1999	6	6	1	213	14

[a] Notes: TMDL Segment = river segment for which a total maximum daily limit (TMDL) has been specified; TMDL Restoration Schedule = mandatory scheduled date for the restoration of the watershed; NPDES Permits = permits issued under the National Pollution Discharge Elimination System (NPDES); Water Supply Systems = drinking water supply systems in the watershed that depend on surface water; COE Sec. 404 Permits = Army Corps of Engineers (COE) actions regarding Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act; and USGS Stations = U.S. Geological Survey (USGS) stream gauging stations in the hydrologic unit.

Source: New Mexico Environment Department and Natural Resources Conservation Service (1998).

U.S. Forest Service), the State of New Mexico and state agencies, and private concerns constitutes the remainder of the area within the boundaries of the Taos Field Office. This pattern of fragmented ownership is particularly important in management of riparian areas, because much of each riparian system lies outside of BLM control, although what happens in those other parts of a given riparian system often affects the portions that BLM administers.

The area within the boundary of the Taos Field Office area of responsibility includes several large Spanish and Mexican land grants, including the Maxwell, Mora, Las Vegas, and Pablo Montoya grants. With the exception of the Sebastian Martin Grant, which was acquired by the United States (with part of the grant area being administered by BLM), these grants should be considered private. Rio Arriba, Santa Fe, and Taos Counties also contain large tracts of Indian lands (Figure 1.4).

Because of the number of small tracts under its jurisdiction, BLM's management task at this Field Office is challenging. To help address this problem, land ownership adjustments have continued to be a priority over the past decade, with a goal of reducing the number of small parcels surrounded by lands under other jurisdiction through sales, exchanges, transfers, and leases.

The largest communities in the Taos Field Office region include Santa Fe, Los Alamos, Española, Taos, Las Vegas, White Rock, and Springer. The first three continued to experience urban and industrial growth through the 1980s; such growth could affect BLM-administered lands. In the case of development in Santa Fe, BLM has received several inquiries about purchase or exchange of large tracts of land, primarily from large developers.

The economy of the portion of northern New Mexico in the Taos Field Office region tends to be diverse — including professional specialties, administrative support, services, and precision production, craft, and repair recorded in the most recent decennial census (U.S. Bureau of the Census 1992). Overall, income was moderate, ranging from much higher levels in Los Alamos County to lower levels in the eastern portion of the region.

3.6 SOCIOECONOMICS AND LIVESTOCK GRAZING

Livestock is an important part of the New Mexico state economy, contributing $1.4 billion in cash receipts in calendar year 1997 (State of New Mexico 1999). Different counties contributed varying amounts to this total, based on the number of cattle, sheep, and other livestock they supported (Table 3.3). The nine counties contained in the Taos Field Office jurisdiction contained about 420,000 head of all types of cattle (beef cattle, dairy cattle, and "other cattle") in 1997 and 1998, and about 7,000 head of sheep in the same years (though data on sheep for four of the nine counties were unavailable) (New Mexico Department of Agriculture 1999).

The land administered by the Taos Field Office varies widely in terms of the resources useful for livestock production. The figures in Section 3.12 for specific riparian areas illustrate the spatial relationship of the allotments and riparian areas under the jurisdiction of the Taos Field Office. Concern often accompanies grazing on public land, due in part to the considerable degradation that accompanied severe overgrazing throughout much of the West during the late 19th and early 20th centuries (Chaney et al. 1990; Ehrhart and Hansen 1998) and in part to the potential impacts of grazing on threatened and endangered species (BLM 1999a). Information on grazing on the land administered by the Taos Field Office tends to be limited, primarily because of the nature of

TABLE 3.3 Selected Livestock Statistics for Counties within the Region Administered by the Taos Field Office of the BLM

	Cattle[a]			Sheep[b]		
Area	1997 Head	1998 Head	1996 Cash Receipts[c]	1997 Head	1998 Head	1996 Cash Receipts[c]
State	4,828,000	4,614,000	$1,400,000,000	288,100	282,200	$15,700,000
Field Office Area	416,000	402,000	$168,511,000	7,100	7,000	$479,000
Colfax County	132,000	120,000	$24,396,000	400	500	$23,000
Harding County	90,000	92,000	$16,633,000	300	300	$17,000
Los Alamos	NA[d]	NA	NA	NA	NA	NA
Mora County	78,000	70,000	$14,416,000	NA	300	NA
Rio Arriba County	58,000	54,000	$10,719,000	2,100	2,000	$118,000
San Miguel County	116,000	108,000	$21,439,000	NA	NA	NA
Santa Fe County	56,000	62,000	$14,273,000	700	500	$39,000
Taos County	18,000	16,000	$3,327,000	3,600	3,400	$203,000
Union County	NA	NA	$63,308,000	NA	NA	$79,000

[a] "Cattle" includes cattle, calves, beef cows, milk cows, and "other cattle (excl. cows)" as of January of the reference year.

[b] "Sheep" includes sheep and lambs, and sheep held for wool production as of January of reference year.

[c] State data are *gross* receipts for calendar year 1995 for cattle, calf, and milk (under "Cattle") and sheep, lamb, and wool (under "Sheep"); County-level cash receipts for "Cattle" refer to cattle and calves, and milk.

[d] NA = data not available.

Source: State of New Mexico (1999); U.S. Department of Agriculture (1999).

those public resources, particularly in the eastern portion of the Field Office area — separate small parcels generally representing unfenced tracts surrounded by (largely) private land. These tracts generally are administered under Section 15 of the Taylor Grazing Act. Because of their small size and relationship to private land, they rarely have allotment plans and for the most part are visited by BLM personnel only infrequently.

The Taos Field Office includes 252 permittees on 264 grazing allotments, involving more than 537,300 acres. As of 1986, the region had an authorized preference for 67,000 animal unit months (AUMs) for livestock (BLM 1987). Virtually all of the AUMs for the region in 1986 were authorized under the Taylor Grazing Act, with about 900 units authorized by the Department of Agriculture — a pattern that continues today. Prescribed use varies by season and livestock class (cattle, sheep, and horses). Each of 24 grazing allotments had specific allotment management plans in 1986; 17 of these were monitored systematically, as prescribed by the Taos Monitoring Plan. Finally, using a Soil Conservation Service (now the Natural Resources Conservation Service) method range inventories were conducted on 77 allotments covering about 310,000 acres in 1983. Those inventories provide detailed information by species on the plants located on a particular tract.

To facilitate range management, the Taos Field Office has been divided into six management units (BLM 1987). These units, along with their grazing management characteristics, are as follows:

- ***Northern Management Unit:*** The resident population highly dependent on livestock for income and on public lands for pasture; unit is used primarily for spring and fall grazing, with the general pattern grazing on private land in winter, BLM-administered land in the spring, National Forest land in the summer, and BLM-administered land once again in the fall.

- ***Ojo/Española Management Unit:*** The resident population partially dependent economically on livestock, but highly culturally dependent on public lands for pasture — mainly because of strong ties to the land; eight community allotments comprise nearly 65,000 acres, or about 12% of the entire Taos Field Office; some allotment management plans or grazing systems have been developed; the general pattern of use emphasizes summer grazing on community allotments (while alfalfa, for winter use, is grown on private land), and fall-winter grazing on those same allotments; the condition of most allotments in this unit is static or improving.

- ***Cebolla Management Unit:*** The resident population is heavily dependent economically on the livestock industry in this remote area and both economically and culturally dependent on grazing access to public lands; the general pattern of use emphasizes summer grazing, although some spring and fall grazing also occurs; the condition of most BLM-administered land used for grazing is static.

- ***Santa Fe Management Unit:*** The resident population varies in the degree of dependence on livestock; seven allotments occur in the unit, in which public lands make up the majority; grazing authorization is year-long; condition of BLM-administered land used for grazing tends to be static or declining.

- ***Sabinoso Management Unit:*** The resident population in this small unit is heavily dependent on livestock and on public land forage; licensed use is year-long; data on condition are unavailable.

- ***East Side Management Unit:*** The resident population relies on BLM-administered and other land for grazing, the BLM-administered parcels being small and scattered; licensed use is year-long; data on condition are unavailable.

3.7 VEGETATION

The Taos Field Office area contains five broad habitats, or vegetative associations: pinyon-juniper woodland, sagebrush grassland, desert shrub-grassland, mixed conifer, and riparian (BLM 1987). More narrowly defined terrestrial habitats include grassland, southwestern Mediterranean, halfshrub grassland, sagebrush grasslands, pinyon-juniper woodlands, upland forest, wooded canyon benches, rocky canyon slopes, mixed shrub hills, and reseeded rolling upland sites. More narrowly defined riparian habitats include rivers, streams, springs, and one lake. Much of the habitat in the region changes with elevation, with forests becoming increasingly prevalent at higher elevations. For purposes of describing vegetation, this diverse region may be divided into 13 subregions on the basis of various physical geographic and biotic characteristics, as follows:

- ***Southern Desert 1:*** Cooler portions are characterized by grasses (e.g., Indian ricegrass, New Mexico feathergrass, galleta, bottlebrush squirreltail, and blue grama). Warmer portions support grasses such as black grama and tobosa. Alkali sacaton, dropseeds, threeawns, and shrubs (e.g., fourwing saltbush, winterfat, Mormon-tea, and broom dalea) grow in both warm and cooler areas. Riparian vegetation along the Rio Grande includes cottonwood, saltcedar, inland saltgrass, and sacatons.

- ***Northern Desert 1:*** Most of this area supports two shrub associations. The intermediate-elevation big sagebrush association includes western wheatgrass, rabbitbrush, bottlebrush squirreltail, and dropseeds. The lower elevation saltbush association includes fourwing saltbush, shadscale, greasewood, alkali sacaton, and galleta. Upper elevations support scattered juniper and pinyon pine, with an understory of big sagebrush, western wheatgrass, Indian ricegrass, and blue grama.

- ***Canadian Plains 1:*** Fine-grained soils in this area support western wheatgrass, blue grama, sideoats grama, and galleta. Alkali sacaton and wheatgrass dominate sites in the drainageways. Areas along natural escarpments, as well as with shallow soils, are characterized by little bluestem, sideoats grama, and blue grama with woody species such as oak, juniper, and mountain mahogany.

- ***Canadian Plains 2:*** Upland sites feature gramas, dropseeds, bluestems, bristlegrass, and small soapweed. Depressional areas are characterized by alkali sacaton, vine-mesquite, and galleta in the north and tobosa in the south. Deep sand and sandhill areas feature bluestems, Indian ricegrass, and soapweed, with sand sage favoring the north and shinney oak the south.

- ***Canadian Plains 3:*** This area supports open pinyon-juniper at higher elevations, with a diverse variety of understory vegetation dominated by sideoats grama, little bluestem, blue grama, bottlebrush squirreltail, western wheatgrass, pinyon ricegrass, Bigelow sagebrush, and winterfat. Lower elevations feature a mixed prairie of little bluestem, grama grasses, western wheatgrass, galleta, New Mexico feathergrass, and a variety of shrubs, halfshrubs, and forbs. Alkaline soils support fourwing saltbush, winterfat, and alkali sacaton, while giant sacaton dominates drainageways at lower elevations and western wheatgrass drainageways at higher elevations.

- ***High Plains 1:*** This area supports bluestems, gramas, western wheatgrass, galleta, and buffalograss. Western wheatgrass is important in depressions (swales), where runoff water is concentrated.

- ***High Plains 2:*** This area supports bluestems, Indiangrass, gramas, and sand sagebrush. Finer-textured soils are dominated by blue grama, galleta, little bluestem, sideoats grama, and western wheatgrass.

- ***Rocky Mountains 1:*** Higher elevations feature forest, alpine meadows, and parks. Characteristic vegetation at those elevations include white fir, Englemann spruce, alpine and cork bark fir, fescue, and bluegrasses. Intermediate elevations support fescue, true mountain mahogany, mountain muhly, little bluestem, and sideoats grama.

- ***Rocky Mountains 2:*** Higher elevations support stands of Englemann spruce, alpine and corkbark fir, with alpine bluegrass, thurber fescue, sedges, and associated forb understories. Intermediate elevations support mixed conifers, such as white fir, Colorado bluespruce, Douglas fir, bristlecone pine, and aspen, with Letterman needlegrass, mountain brome, fescues, and bluegrasses as understory. Lower elevations feature ponderosa pine, Rocky Mountain juniper, and Gambel oak, with Arizona fescue and mountain muhly understories. Valleys in this area feature mountain big sagebrush, junegrass, fescues, and wheatgrasses.

- ***High Intermountain Valleys 1:*** Vegetation resembles that of the Great Basin Desert Shrub formation and features big sagebrush, black sagebrush, western wheatgrass, and galleta. Highly calcareous soils feature winterfat, fourwing saltbush, and winter wheatgrass. Foothills vegetation is composed of juniper, pinyon, western wheatgrass, and small amounts of big sagebrush.

- ***High Intermountain Valleys 2:*** Vegetation resembles that of the Great Basin Desert Shrub formation, dominated by mountain big sagebrush, Wyoming big sagebrush, western wheatgrass, and galleta. Foothills vegetation is composed of juniper, pinyon, blue grama, galleta, and small amounts of mountain big sagebrush.

- ***Western Plateaus 1:*** Higher elevations feature pinyon-oak forest interspersed with big sagebrush. Associated grasses include western wheatgrass, needle-and-thread, galleta, muttongrass, and bottlebrush squirreltail. Lower elevations feature scattered pinyon, extensive areas of big sagebrush, galleta, and Indian ricegrass.

- ***Western Plateaus 2:*** Most of this area is characterized by grassland and a mixed shrubland plant community. Upper elevations feature pinyon-juniper woodlands — characterized by alligator juniper, oneseed juniper, shrub live oak, bullgrass, little bluestem, pinyon ricegrass, and blue grama. Grass-dominated lands occur on deeper soils and level-to-gently rolling terrain; they are characterized by western wheatgrass, spike muhly, blue grama, and galleta. On shallow or stony soils, occurring on steeper slopes, juniper and pinyon pine become components of the plant communities.

Although of greatest interest economically, productive forest land comprises fewer than 8,500 acres of the Taos Field Office-administered land. Located primarily in the more mountainous northern portion of the region, much of the forest in the region consists of ponderosa pine, occasionally mixed with Douglas fir, white fir, and spruce. Available timber (volume-per-acre) is quite low, and most of the forest is marginal for timber production.

Pinyon-juniper woodland dominates the western portion of the Taos Field Office. Although of limited interest for forestry, pinyon-juniper woodland provides an important source of firewood in northern New Mexico, with an estimated 85% percent of the population using it as fuel in the mid-1980s.

3.8 WILDLIFE

Consistent with the variability of the natural setting in the Taos Field Office, the wildlife present in the region consists of a long and varied list (BLM 1987). The wildlife population includes mainly species common to the Great Basin Conifer Woodland, Plains Grassland, Great Basin Desert Shrub, and Montane Conifer Forest biomes. Terrestrial habitats include grassland, southwestern Mediterranean, halfshrub grassland, sagebrush grasslands, pinyon-juniper woodlands, upland forest, wooded canyon benches, rocky canyon slopes, mixed shrub hills, and reseeded rolling upland sites. Aquatic and riparian habitats, relatively extensive in the Taos Field Office, include rivers, streams, springs, and one lake. Aquatic habitats with coldwater fish exist, as do warmwater fisheries.

Mule deer occur throughout most of the Taos Field Office area, primarily in woodland and timbered areas; mule deer winter ranges have been mapped and crucial ranges identified. Rocky Mountain elk also occur in the region, although primarily in the northern portions (including Pot Mountain, Wind Mountain, Cerro Montoso, Guadalupe Mountain, and West Picuris). Winter populations increase substantially as elk from a broad area in northern New Mexico and southern Colorado congregate in the San Antonio/Pot Mountain Wildlife Habitat Area. The largest predators in the Taos Field Office area are black bear and mountain lion, which occur in limited numbers and mainly in mountainous areas. Coyotes, in contrast, are abundant throughout the region in all habitats. Smaller predators, such as ringtailed cat, grey fox, and bobcat, also occur throughout the region, although not in large numbers. A variety of small mammals occur in the Taos Field Office area. Included are desert cottontail and prairie dog. Populations of small mammals tend to vary substantially from year to year, depending on the favorability of habitat conditions.

Upland game birds, including mourning dove, scaled quail, Merriam's turkey, bandtailed pigeon, and blue grouse, occur in the Taos Field Office region, although generally in small numbers. Waterfowl and shore birds occasionally are seen along major rivers and in impoundment areas, and include the common merganser, mallard, and Canada goose (the latter mainly found in the upper Rio Grande gorge). Birds of prey observed in the Taos Field Office region include prairie falcon, peregrine falcon, bald eagle, golden eagle, great horned owl, redtailed hawk, and American kestrel; most birds of prey tend to inhabit the upper Rio Grande gorge.

3.9 RARE, THREATENED, AND ENDANGERED SPECIES

A number of federally listed threatened or endangered species and other species of special concern (e.g., state-listed species) are known to occur, or could occur, on lands managed by the Taos Field Office, although not all of these species will normally occur within riparian habitats. Protected species occurring within counties containing riparian areas managed by the Taos Field Office are presented in Table 3.4. Species habitat requirements and population status are discussed in Appendix A.

One of the more important species in the Taos Field Office area is the southwestern willow flycatcher (*Empidonax traillii extimus*), listed as an endangered species by the USFWS in 1995 (BLM 1998c). Small groups of southwestern willow flycatcher territories have been identified along the Rio Grande and the

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TABLE 3.4 Endangered, Threatened, and Candidate Species, and Species of Concern by County within the Taos Field Office Jurisdiction

Common Name	Scientific Name	Status[a]
Colfax County		
Black-footed ferret	*Mustela nigripes*	E
Fringed myotis	*Myotis thysanodes*	SC
Long-eared myotis	*Myotis evotis*	SC
Long-legged myotis	*Myotis volans*	SC
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Swift fox	*Vulpes velox*	C
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)
Baird's sparrow	*Ammodramus bairdii*	SC
Bald eagle	*Haliaeetus leucocephalus*	T
Black tern	*Chlidonias niger*	SC
Loggerhead shrike	*Lanius ludovicianus*	SC
Ferruginous hawk	*Buteo regalia*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T
Mountain plover	*Charadrius montanus*	C
Northern goshawk	*Accipiter gentilis*	SC
Piping plover	*Charadrius melodus*	T
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
Western burrowing owl	*Athene cunicularia hypugea*	SC
White-faced ibis	*Plegadis chihi*	SC
Arkansas River shiner	*Notropis girardi*	T
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Plains minnow	*Hybognathus placitus*	SC
Texas horned lizard	*Phrynosoma cornutum*	SC
Dwarf milkweed	*Asclepias uncialis var. uncialis*	SC-C
Los Alamos County		
Big free-tailed bat	*Nyctinomops macrotis (=Tadarida m., T. molossa)*	SC
Black-footed ferret	*Mustela nigripes*	E
Goat Peak pika	*Ochotona princeps nigrescens*	SC
Long-legged myotis	*Myotis volans*	SC
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Spotted bat	*Euderma maculatum*	SC
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)

TABLE 3.4 (Cont.)

Common Name	Scientific Name	Status[a]
Bald eagle	*Haliaeetus leucocephalus*	T
Ferruginous hawk	*Buteo regalis*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T
Loggerhead shrike	*Lanius ludovicianus*	SC
Northern goshawk	*Accipiter gentilis*	SC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
White-faced ibis	*Plegadis chihi*	SC
Whooping crane	*Grus americana*	XN
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Jemez Mountains salamander	*Plethodon neomexicanus*	SC
New Mexico silverspot butterfly	*Speyeria nokomis nitocris*	SC
Mora County		
Black-footed ferret	*Mustela nigripes*	E
Fringed myotis	*Myotis thysanodes*	SC
Long-legged myotis	*Myotis volans*	SC
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Pale Townsend's (=western) big-eared bat	*Plecotus townsendii pallescens*	SC
Spotted bat	*Euderma maculatum*	SC
Swift fox	*Vulpes velox*	C
Yuma myotis	*Myotis yumanensis*	SC
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)
Baird's sparrow	*Ammodramus bairdii*	SC
Bald eagle	*Haliaeetus leucocephalus*	T
Ferruginous hawk	*Buteo regalia*	SC
Loggerhead shrike	*Lanius ludovicianus*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T
Mountain plover	*Charadrius montanus*	C
Northern goshawk	*Accipiter gentilis*	SC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
Western burrowing owl	*Athene cunicularia hypugea*	SC
White-faced ibis	*Plegadis chihi*	SC
Arkansas River shiner	*Notropis girardi*	PE w/CH
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Texas horned lizard	*Phrynosoma cornutum*	SC
New Mexico silverspot butterfly	*Speyeria nokomis nitocris*	SC

TABLE 3.4 (Cont.)

Common Name	Scientific Name	Status[a]
Rio Arriba County		
Big free-tailed bat	*Nyctinomops macrotis* *(=Tadarida m., T. molossa)*	SC
Black-footed ferret	*Mustela nigripes*	E
Goat Peak pika	*Ochotona princeps nigrescens*	SC
Long-eared myotis	*Myotis evotis*	SC
Long-legged myotis	*Myotis volans*	SC
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Pale Townsend's (=western) big-eared bat	*Plecotus townsendii pallescens*	SC
Small-footed myotis	*Myotis ciliolabrum*	SC
Southwestern otter	*Lutra canadensis sonorae*	SC
Spotted bat	*Euderma maculatum*	SC
Yuma myotis	*Myotis yumanensis*	SC
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)
Baird's sparrow	*Ammodramus bairdii*	SC
Bald eagle	*Haliaeetus leucocephalus*	T
Black tern	*Chlidonias niger*	SC
Ferruginous hawk	*Buteo regalia*	SC
Harlequin duck	*Histrionicus histrionicus*	SC
Interior least tern	*Sterna antillarum athalassos*	E
Loggerhead shrike	*Lanius ludovicianus*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T
Northern goshawk	*Accipiter gentilis*	SC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
White-faced ibis	*Plegadis chihi*	SC
Whooping crane	*Grus americana*	XN
Colorado pikeminnow[b]	*Ptychocheilus lucius*	E
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Roundtail chub	*Gila robusta*	SC
Boreal western toad	*Bufo boreas boreas*	C
Jemez Mountains salamander	*Plethodon neomexicanus*	SC
Arizona willow	*Salix arizonica*	SC
Ripley's milk-vetch	*Astragalus ripleyi*	SC
San Miguel County		
Black-footed ferret	*Mustela nigripes*	E
Fringed myotis	*Myotis thysanodes*	SC
Long-eared myotis	*Myotis evotis*	SC

TABLE 3.4 (Cont.)

Common Name	Scientific Name	Status[a]
Long-legged myotis	*Myotis volans*	SC
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Pale Townsend's (=western) big-eared bat	*Plecotus townsendii pallescens*	SC
Pecos River muskrat	*Ondatra zibethicus ripensis*	SC
Small-footed myotis	*Myotis ciliolabrum*	SC
Spotted bat	*Euderma maculatum*	SC
Swift fox	*Vulpes velox*	C
Yuma myotis	*Myotis yumanensis*	SC
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)
Baird's sparrow	*Ammodramus bairdii*	SC
Bald eagle	*Haliaeetus leucocephalus*	T
Black tern	*Chlidonias niger*	SC
Brown pelican	*Pelecanus occidentalis*	E
Ferruginous hawk	*Buteo recalls*	SC
Loggerhead shrike	*Lanius ludovicianus*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T
Mountain plover	*Charadrius montanus*	C
Northern goshawk	*Accipiter gentilis*	SC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
Western burrowing owl	*Athene cunicularia hypugea*	SC
White-faced ibis	*Plegadis chihi*	SC
Whooping crane	*Grus americana*	XN
Arkansas River shiner	*Notropis girardi*	T
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Plains minnow	*Hybognathus placitus*	SC
Texas horned lizard	*Phrynosoma cornutum*	SC
New Mexico silverspot butterfly	*Speyeria nokomis nitocris*	SC
Dwarf milkweed	*Asclepias uncialis var. uncialis*	SC
Chiricahua dock	*Rumex orthoneurus*	PT
Holy Ghost ipomopsis	*Ipomopsis sancti-spiritus*	E
Santa Fe County		
Black-footed ferret	*Mustela nigripes*	E
Fringed myotis	*Myotis thysanodes*	SC
Long-legged myotis	*Myotis volans*	SC
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Pale Townsend's (=western) big-eared bat	*Plecotus townsendii pallescens*	SC

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TABLE 3.4 (Cont.)

Common Name	Scientific Name	Status[a]
Small-footed myotis	*Myotis ciliolabrum*	SC
Spotted bat	*Euderma maculatum*	SC
Yuma myotis	*Myotis yumanensis*	SC
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)
Baird's sparrow	*Ammodramus bairdii*	SC
Bald eagle	*Haliaeetus leucocephalus*	T
Ferruginous hawk	*Buteo regalis*	SC
Loggerhead shrike	*Lanius ludovicianus*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T
Mountain plover	*Charadrius montanus*	C
Northern goshawk	*Accipiter gentilis*	SC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
White-faced ibis	*Plegadis chihi*	SC
Whooping crane	*Grus americana*	XN
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Texas horned lizard	*Phrynosoma cornutum*	SC
Chiricahua dock	*Rumex orthoneurus*	PT
Santa Fe cholla	*Opuntia viridiflora*	SC
Taos County		
Black-footed ferret	*Mustela nigripes*	E
Fringed myotis	*Myotis thysanodes*	SC
Long-eared myotis	*Myotis evotis*	SC
Long-legged myotis	*Myotis volans*	SC
New Mexican jumping mouse	*Zapus hudsonius luteus*	SC
Occult little brown bat	*Myotis lucifugus occultus*	SC
Pale Townsend's (=western) big-eared bat	*Plecotus townsendii pallescens*	SC
Small-footed myotis	*Myotis ciliolabrum*	SC
Southwestern otter	*Lutra canadensis sonorae*	SC
Spotted bat	*Euderma maculatum*	SC
Yuma myotis	*Myotis yumanensis*	SC
American peregrine falcon	*Falco peregrinus anatum*	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)
Baird's sparrow	*Ammodramus bairdii*	SC
Bald eagle	*Haliaeetus leucocephalus*	T
Ferruginous hawk	*Buteo regalis*	SC
Harlequin duck	*Histrionicus histrionicus*	SC
Loggerhead shrike	*Lanius ludovicianus*	SC
Mexican spotted owl	*Strix occidentalis lucida*	T

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TABLE 3.4 (Cont.)

Common Name	Scientific Name	Status[a]
Mountain plover	*Charadrius montanus*	C
Northern goshawk	*Accipiter gentilis*	SC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
White-faced ibis	*Plegadis chihi*	SC
Whooping crane	*Grus americana*	XN
Flathead chub	*Platygobio (=Hybopsis) gracilis*	SC
Cockerell's striate disc (snail)	*Discus shemeki cockerelli*	SC
New Mexico silverspot butterfly	*Speyeria nokomis nitocris*	SC
Sangre de Cristo peaclam	*Pisidium sanguinichristi*	SC
Arizona willow	*Salix arizonica*	SC
Chiricahua dock	*Rumex orthoneurus*	PT
Ripley milk-vetch	*Astragalus ripleyi*	SC

[a] Status codes are: E = endangered; PE w/CH = proposed endangered with critical habitat; T = threatened; C = candidate species; SC = species of concern; S/A = similarity of appearance; XN = nonessential experiment.

[b] Colorado pikeminnow is the currently accepted common name for *Ptychocheilus lucius*, formerly known as Colorado squawfish (Nelson et al. 1998).

Source: USFWS (1999).

Rio Chama. However, no occupied southwestern willow flycatcher habitat or unoccupied, currently potential, habitat occurs within the riparian areas under the jurisdiction of the Taos Field Office that are within the scope this analysis. Approximately 26 miles of riparian habitat, including 1,510 acres, support potential southwestern willow flycatcher habitat. One riparian area (Rio de Truchas) has potential habitat in the short term (1-3 years) while seven riparian areas (Lobo Canyon, Ojo Caliente Riparian Demonstration Area, upper Ojo Caliente, Rio Cebolla, Rio de los Pinos, Santa Cruz River Above Lake, and Santa Fe River) have potential habitat in the long term (4-10 years). A Biological Opinion on the Taos Resource Area RMP (USFWS 1997) determined that the actions implemented under the RMP (BLM 1988) are likely to jeopardize the continued existence of the southwestern willow flycatcher. As a result of that determination, the Southwestern Willow Flycatcher Management Plan (Taos Resource Area) (BLM 1998c) was developed. Management activities identified in that plan are designed to protect, improve, or reestablish southwestern willow flycatcher habitat within the area managed by the Taos Field Office.

Three riparian areas (Canadian River, Carrizo Creek, and Mora River) provide winter foraging habitat for the American peregrine falcon (*Falco peregrinus anatum*), listed by the USFWS as an endangered species. These three riparian areas consist of about 89 acres and extend a total of 3 miles in length.

The Arkansas River shiner (*Notropis girardi*) is listed as a threatened species by the USFWS and is listed by the State of New Mexico as endangered. This species occurs in stream and river segments associated with three riparian areas managed by the Taos Field Office (Canadian River, Carrizo Creek, and Mora River). These riparian areas consist of approximately 89 acres and total about 3 miles in length. A non-native, introduced population occurs in the Pecos River.

The Canadian River, Carrizo Creek, and Mora River riparian areas also provide winter foraging habitat for the bald eagle (*Haliaeetus leucocephalus*), listed by the USFWS as a threatened species.

3.10 RECREATION AND WILDERNESS

Accessibility to water, mountains, historical sites, and art galleries, coupled with the unique blend of northern New Mexico cultures, has made the area bounded by the Taos Field Office jurisdiction the most important tourist area in New Mexico (BLM 1987). With regard to outdoor recreation, BLM's *Recreation Opportunity Spectrum* provides a framework for describing recreation opportunities in the region. On the basis of remoteness, physical setting, and social setting, recreational opportunities on the public land administered by the Taos Field Office can be categorized as (1) Primitive (Special Management Areas); (2) Semi-primitive, Nonmotorized (133,840 acres); (3) Semiprimitive, Motorized (218, 415 acres); (4) Roaded Natural (99,842 acres); and (5) Rural (111,750 acres). No portion of the Taos Field Office-administered land falls into the Urban recreation category. As a consequence of this range of recreational opportunities, considerable money flows into northeastern New Mexico, and thousands of tourism-related jobs are generated.

Recreational resources in the area include the Rio Grande Wild and Scenic River (BLM n.d.a.). This special designation includes 48 miles of the Rio Grande from the Colorado border south to 1.5 miles below the Taos-Rio Arriba county line, along with 4 miles along the Red River to its confluence with the Rio Grande, originally designated wild and scenic by Congress in 1964. It also includes an additional 12 miles along the Rio Grande, continuing south from the earlier-designated area to Velarde, New Mexico, added to the wild and scenic designation by Congress in 1992 (BLM 1998a). The area administered by BLM includes 16,332 acres along the upper gorge unit of the Rio Grande, 1,363 acres in the Guadalupe Mountain ACEC, 5,763 acres in the Orilla Verde Recreation Area, 1,355 acres in the Racecourse ACEC, 663 acres in the Black Mesa ACEC, 12,567 acres in the Warm Springs Special Management Area (SMA), and 498 acres in the Lower Embudo SMA. Recreational activities throughout this wild and scenic river area include boating, fishing, hiking, birding, camping, picnicking, and rock climbing.

Santa Cruz Lake Recreation Area comprises an artificial lake formed by damming the upper Santa Cruz River and associated surrounding land. The total recreation area covers about 2,543 acres, of which 110 acres represents the reservoir itself. BLM maintains 34 day-use camping spaces, 29 shelters, and 5 toilets on the northern end of the lake, as well as 13 shelters and 1 comfort station on a bluff near the lake. Recreation opportunities at Santa Cruz Lake primarily are classified as *Rural*.

The BLM-administered portion of the Rio Chama Wild and Scenic River is located between El Vado Reservoir and the Santa Fe National Forest boundary. This area currently is managed jointly by BLM and the Santa Fe National Forest through a memorandum of understanding, with BLM managing all aspects of commercial and private boating on 30.4 miles of the river. The Rio Chama Canyon is classified primarily within the *Semiprimitive, Nonmotorized* category.

Two areas administered by the Taos Field Office have been designated for intensive off-road vehicle (ORV) use. One is the Fun Valley ORV use area, located northeast of Española; the other is the Sombrillo ORV use area, located southwest of Española.

The Taos Field Office region contains three wilderness study areas (WSAs): the Rio San Antonio WSA, the Rio Chama WSA, and the Sabinoso WSA. The Rio San Antonio WSA is located in northernmost New Mexico and comprises 8,330 acres in all — 7,050 acres administered by the BLM and 1,280 acres of state land. The major component is Rio San Antonio Canyon, which is valued for its undisturbed and natural condition and supports an extensive riparian community. The Rio Chama WSA is in Rio Arriba County, about 3.5 miles south of El Vado, and comprises 11,985 acres (including 320 acres of private land, the remainder being public lands administered by BLM). A key component of this area once again is the associated canyon, which remains quite natural. The Rio Chama WSA features, among other things, 485 acres of riparian vegetation. The Sabinoso WSA is located in San Miguel County about 8 miles northeast of Trujillo. The area consists of 15,760 acres (320 acres of private holdings and the rest public lands administered by the BLM). This wilderness study area combines vast open expanses and rugged canyons, creating a feeling of rolling prairie throughout much of its area.

3.11 PALEONTOLOGY

As of 1986, no detailed paleontological inventory had been prepared for the public land administered by the Taos Field Office (BLM 1987). A reconnaissance of the western portion of the region, conducted by the University of New Mexico in 1978, provided some insights on paleontological resources in that portion of the region. The nature of any paleontological resources in the eastern part of the region remains largely unknown.

On the basis of general geological principles, the potential for paleontological remains in the region is quite high. About 72% of the land administered by the Taos Field Office features surface and near-surface occurrences of sedimentary rocks. The potential of various exposed formations to bear fossils varies. Most of the sedimentary deposits in the region contain fossils, with the Santa Fe Group featuring one of the most abundant, diverse, and thoroughly collected tertiary vertebrate faunas in the world (Kues 1982; Kues et al. 1978; Savage and Russell 1983). Santa Fe Group exposures occur in about 50% of the region. As of 1986, relatively little scientific study had been conducted on the paleontological resources in other deposits, including Dakota Sandstone, Mancos Shale (Cobban 1969), Mesa Verde Formation, Galisteo Formation, Chamita Formation (MacFadden 1977), and Española Formation (Galusha and Blick 1971).

3.12 CULTURAL RESOURCES

As of 1999, about 29,300 acres (5.2%) of the 564,000 acres of public land administered by the Taos Field Office of BLM had been intensively surveyed for cultural resources. Archaeological sites in the region run the gamut of prehistoric and historic periods (BLM 1987), with the main chronological divisions listed as follows (see Cordell 1997):

- Paleoindian Period (9500-5500 BC),
- Archaic Period (5500 BC-AD 400),

- Pueblo Developmental Period (AD 400-AD 1200),
- Pueblo Coalition Period (AD 1200-1325),
- Pueblo Classic Period (AD 1325-1541), and
- Historic (post-AD 1541).

Sites from each period reflect the cultural behavior characteristic of that period. Thus, sites from the Paleoindian Period indicate small bands of migratory big-game hunters; sites from the Archaic Period indicate small bands of hunter-gatherers carefully adapted to available natural resources; sites from the Pueblo Developmental Period indicate a shift from mobile bands to sedentary agriculturalists, and so on. Although water often attracts human settlement in semiarid settings such as northern New Mexico, no archaeological sites are known to exist in riparian areas administered by the Taos Field Office.

The BLM plans for the use and protection of cultural resources through the BLM Planning System. One area of special interest, the Ojo Caliente ACEC, and nine special management areas concerned with cultural resources were designated in the resource management plan in 1987. Two plans for ACECs have been prepared. The Ojo Caliente Plan, completed in 1990, sets management goals and planned actions for the management of an area that contains seven large pueblos inhabited by Tewa Indians during the Classic Pueblo Period (AD 1300-1600). The La Cienega ACEC, designated in 1992, features a rich inventory of cultural resources that include pueblo ruins and thousands of petroglyphs.

Presently, five sites administered by the Taos Field Office are listed on the National Register of Historic Places. The Pueblo of San Lazaro has been designated a National Historic Landmark. Many more sites have been determined to be eligible for the National Register.

3.13 RIPARIAN AREA DETAILED DISCUSSIONS

Riparian areas are localities directly influenced by permanent water, with visible vegetation or physical characteristics that indicate that influence. Although lake shores and stream banks are typical riparian areas, springs, seeps, and normally dry drainages that have a shallow water table with vegetation requiring permanent water also are classified as riparian. In semiarid settings such as the lands managed by the Taos Field Office, even small riparian areas often play an important role in managing overall ecosystem health, despite their small size and (frequently) dispersed geographic distribution.

The condition of riparian areas is assessed by BLM on the basis of selected physical characteristics. During the late 1980s, BLM employed a classification system based on streambank condition, vegetative bank protection, and the status of the main water source(s), assigning a rating to each: (1) 1.0-1.9 (Poor); (2) 2.0-2.9 (Fair); (3) 3.0-3.9 (Good); and (4) 4.0 (Excellent). These ratings were then averaged for each riparian area, and the resulting overall classification was evaluated based on the four-part system used for each individual quality.

More recently, riparian habitats have been classified as one of the following four categories: (1) Proper Functioning Condition (PFC); (2) Functional – at Risk (FAR); (3) Nonfunctional (NF); and (4) Unknown (U) (BLM 1998b). These ratings reflect hydromorphic, vegetation, erosion/deposition, soils, water quality, and, in some cases, external non-system-related factors. They are applied qualitatively, after a systematic assessment of each of the above characteristics. In order for a riparian area to be rated as PFC, adequate vegetation needs to be present to:

- Dissipate stream energy associated with high water flow, thereby reducing erosion and maintaining acceptable water quality;
- Filter sediment, capture bedload, and aid in flood plain development;
- Improve water retention and groundwater recharge;
- Develop root masses that are capable of stabilizing streambanks against erosion; and
- Develop diverse ponding and channel characteristics that provide suitable habitat, water depth, duration, and temperature.

Diversions from any of these requirements reduce a riparian area's overall rating. When a riparian area is in functional condition but when soil, water, or vegetation characteristics make it susceptible to degradation, it is classified as FAR. Riparian areas lacking adequate vegetation, landforms, or large woody debris to dissipate stream energy associated with high flows, thereby lacking the ability to reduce energy and improve water quality, are deemed NF. Finally, those riparian areas for which BLM lacks adequate data to evaluate condition are classified as U.

Both of the above rating systems have been applied to most of the riparian areas in the Taos Field Office that are discussed in this DEIS. The remainder of this section contains descriptions of the individual riparian areas, including their categorization. The figures presented with the descriptions show the spatial relationship between riparian areas and grazing allotments in the area under Taos Field Office jurisdiction.

3.13.1 Canadian River

The Canadian River riparian area is located 4,820 feet above mean sea level (MSL) and extends over 1 mile (covering 36.3 acres) in the southeastern part of Mora County (Figure 3.1). The source of water for this riparian area is the Canadian River, a perennial stream that is a major drainage on the eastern side of the Sangre de Cristo mountain range. The river has cut a 600 ft-deep scenic canyon through sandstone. Private land surrounds the BLM-administered tract. Vegetation in the area was classified as grama-buffalo grass 58 (Kuchler Association), although pinyon-juniper woodland also occurred, along with scattered cottonwood trees and tamarisk. BLM staff noted very little erosion. This portion of the Canadian River provides winter foraging habitat for the bald eagle (federally listed as threatened) and peregrine falcon (federally listed as endangered). The Arkansas River shiner (federally listed as threatened) occurs within this reach of the Canadian River.

BLM staff recorded light ORV use in the area, the evidence primarily being jeep tracks that extend into the riparian area but appear to be used infrequently. The staff also recorded light grazing, the area lying within Allotment No. 00853. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Given its overall condition and certain characteristics, including the presence of thick grass along the riverbank to protect against erosion, BLM staff judged the Canadian River riparian area to be in good condition when visited on September 27, 1989. However, they recategorized it as NF — due largely to grazing, the presence of most vegetation on uplands and

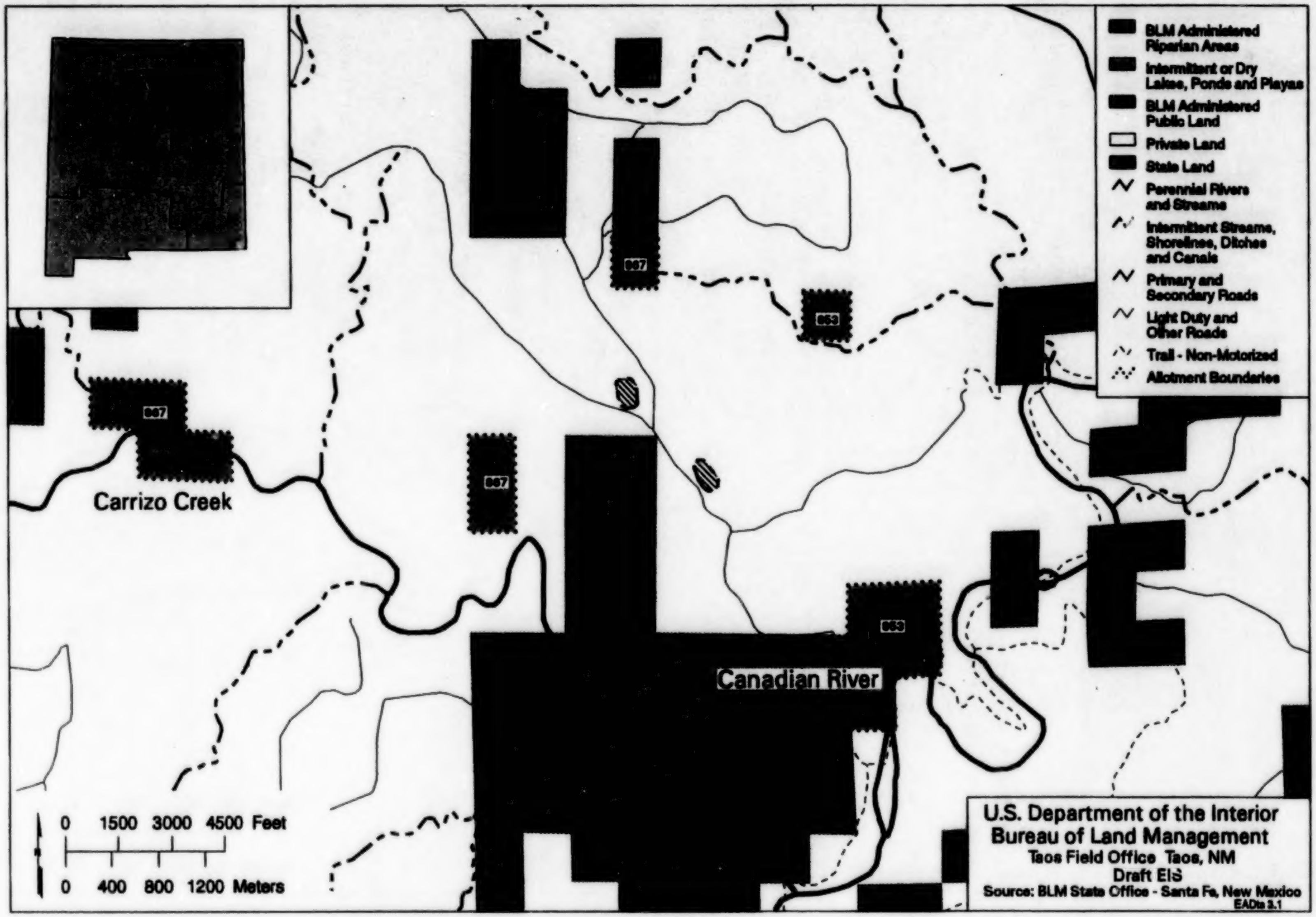
BLM Administered Riparian Areas
Intermittent or Dry Lakes, Ponds and Playas
BLM Administered Public Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Primary and Secondary Roads
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
867
653
867
867
653
Carrizo Creek
Canadian River
0 1500 3000 4500 Feet
0 400 800 1200 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.1

FIGURE 3.1 Canadian River and Carrizo Creek Riparian Areas

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general degradation — when they reevaluated this riparian area on July 8, 1994.

3.13.2 Carrizo Creek

The Carrizo Creek riparian area is located 5,780 feet MSL and extends over 0.5 mile (covering 16 acres) in the southeastern part of Mora County (Figure 3.1). Carrizo Creek, the source of water for this riparian area, is a small perennial stream that flows into the Canadian River, cutting a small gorge near the confluence with that larger waterway. The riparian area is on land administered by BLM, although it is surrounded by private land holdings. Vegetation consists of grama-buffalo grass 58 (Kuchler Association). BLM staff noted slight erosion along the stream bank. This portion of Carrizo Creek supports the Arkansas River shiner and provides winter foraging habitat for the bald eagle and peregrine falcon.

ORV use was light, limited to a jeep track that crosses the creek. Grazing appeared to be moderate. Although the riparian area lies within Allotment No. 00867, much of the grazing activity likely was due to encroachment by cattle from surrounding private landholdings. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. BLM staff classified the Carrizo Creek riparian area as fair when they visited it on September 27, 1989. They recategorized it as NF, the problems due largely to grazing, when they reassessed the area on July 8, 1994.

3.13.3 Chico Creek

The Chico Creek riparian area is located at 5,800 feet MSL and extends over 1 mile (covering 1.5 acres) in south-central Colfax County (Figure 3.2). The source of water for this riparian area is a small section of Chico Creek, which is a perennial stream flowing through grassland. The BLM-administered tract is surrounded by private landholdings. Vegetation in the area was classified as grama-buffalo grass 58 (Kuchler Association). BLM staff noted some erosion along the streambank.

Evidence for light ORV use was observed in this riparian area, although the flat grassland in which the area occurs makes it very accessible for such activity. Grazing was moderate, with many cattle observed in the area, although the riparian area itself is not located within an allotment. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Although small in size, largely because of its perennial nature and the presence of thick grass as a protection against further erosion, BLM staff classified the condition of the Chico Creek riparian area as fair when they evaluated it on October 25, 1989. It has not been reevaluated in terms of its functioning condition.

3.13.4 Cieneguilla

The Cieneguilla riparian area is located at 6,600 feet MSL and extends over 4.2 miles (covering 33.1 acres) in the south-central part of Taos County (Figure 3.3). The source of water for this riparian area is a small perennial stream amidst a larger tract of BLM-administered land. Vegetation in the area was classified as pinyon-juniper woodland 21 (Kuchler Association).

BLM staff noted no evidence of ORV use in the Cieneguilla riparian area, despite the presence of historic and modern roads in the immediate vicinity. Similarly, evidence of grazing (present and past) was absent, although the riparian area lies within Allotment No. 00518. No mining activity was noted in the area in 1989, although mining claims were identified and mining apparently was observed during a subsequent assessment in 1994. Potential problems include pollution from

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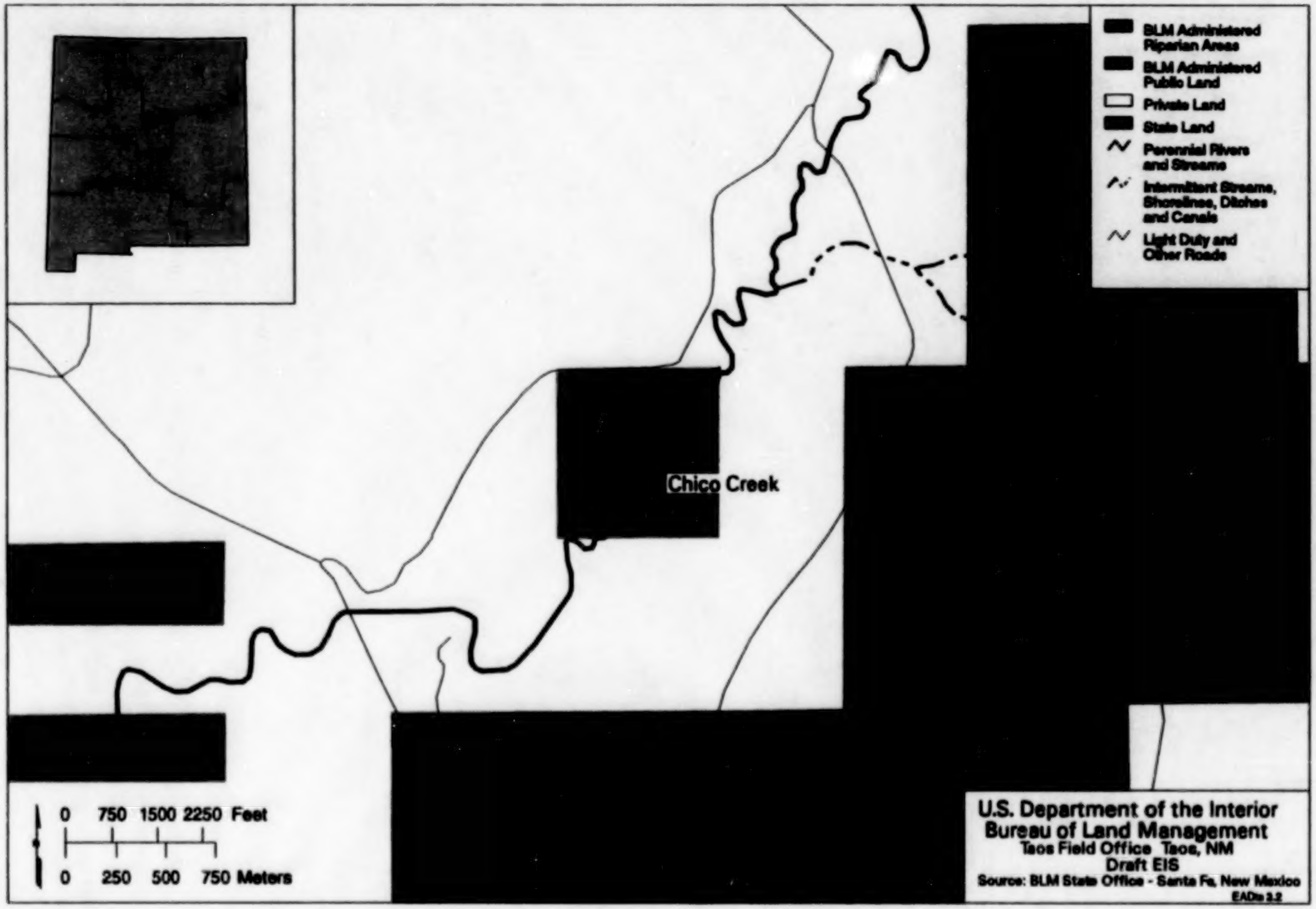
BLM Administered Riparian Areas
BLM Administered Public Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Light Duty and Other Roads
Chico Creek
0 750 1500 2250 Feet
0 250 500 750 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADs 3.2

FIGURE 3.2 Chico Creek Riparian Area

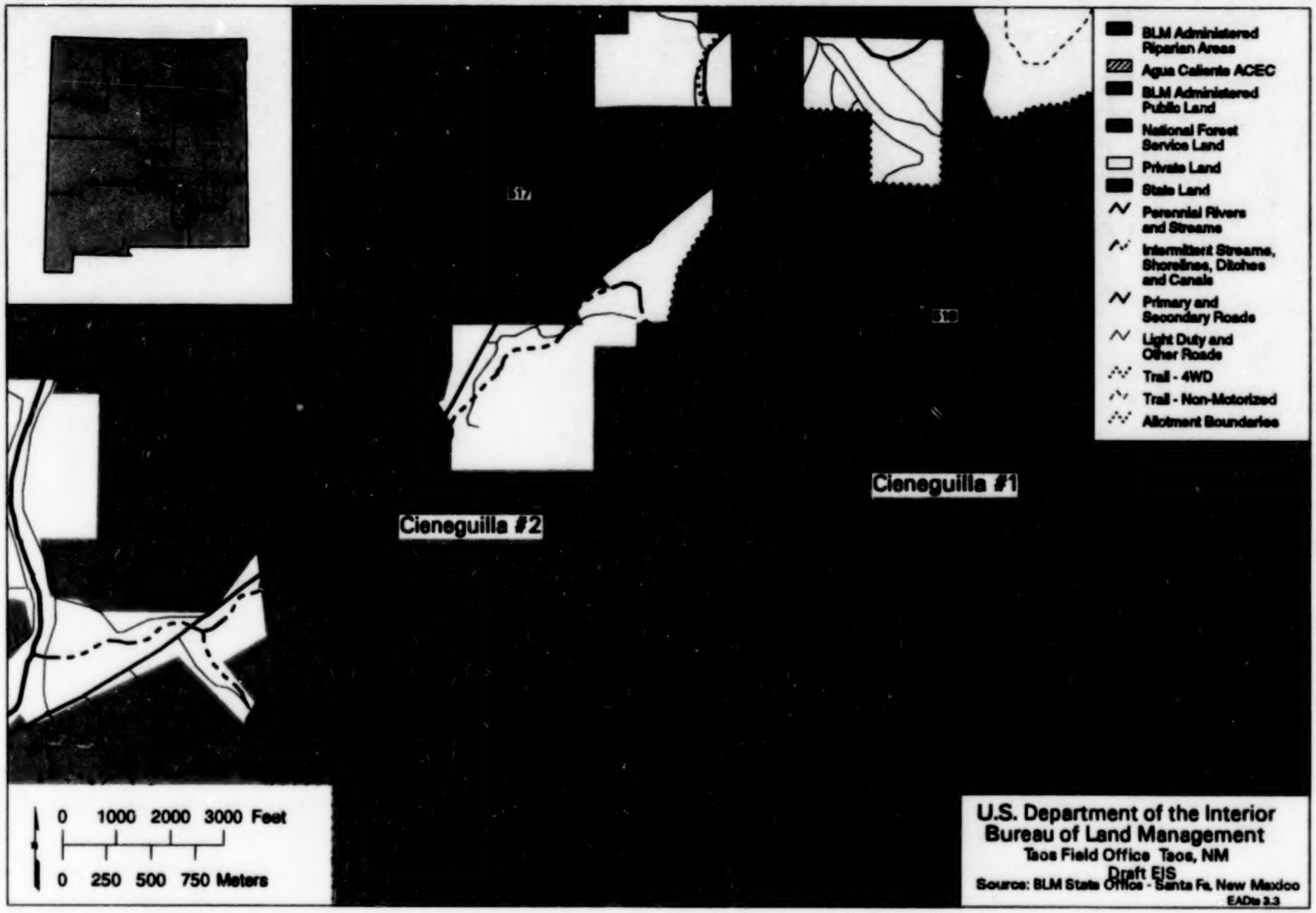
BLM Administered Riparian Areas
Agua Caliente ACEC
BLM Administered Public Land
National Forest Service Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Primary and Secondary Roads
Light Duty and Other Roads
Trail - 4WD
Trail - Non-Motorized
Allotment Boundaries
517
518
Cieneguilla #1
Cieneguilla #2
0 1000 2000 3000 Feet
0 250 500 750 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.3

FIGURE 3.3 Cieneguilla Riparian Areas

agricultural runoff and recreation (State of New Mexico n.d.). The potential for oil- and gas-related activity was deemed low. BLM staff classified the condition of the Cieneguilla riparian area as poor when they visited it on April 24, 1989. They categorized its condition as NF, due largely to historic and current roads, when they reassessed the area on July 11, 1994.

3.13.5 Cow Creek

Cow Creek riparian area is located at 6,200 feet MSL and extends over 1 mile (1.8 acres) in the west-central part of San Miguel County (Figure 3.4). Cow Creek, the source of water for this riparian area, is a small perennial stream. The area and surrounding land are public land administered by BLM. Vegetation in the area was classified as pine-Douglas fir 7 (Kuchler Association), although pinyon-juniper woodland and grass (along the streambank) also were noted. BLM staff observed evidence of some erosion along the streambank.

No evidence of ORV use was observed, but four-wheel drive roads occurred close to the riparian area. The riparian area lies within grazing Allotment No. 00904; grazing activity was light to medium, involving cattle from nearby small ranches. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed moderate. BLM staff classified the condition of the Cow Creek riparian area as fair when they visited it on September 12, 1989. They categorized it as FAR, with problems largely attributed to grazing, when they reassessed the area on July 8, 1994.

3.13.6 Lobo Canyon

Lobo Canyon riparian area is located at 6,780 feet MSL and extends over 0.8 mile (1.4 acres) in the east-central part of Rio Arriba County (Figure 3.5). The source of water for this riparian area is a series of small perennial springs that flow into the Rio Cebolla. The area and surrounding land are administered by BLM. Vegetation in the area was classified as pine-Douglas fir 17 (Kuchler Association), although pinyon-juniper woodland and grass also were noted. Three coyotes also were observed near the head of the canyon at the time of assessment in the late 1980s. BLM staff observed evidence of some erosion near the springs. The Lobo Canyon riparian area supports potential habitat (in the long term) for the southwestern willow flycatcher (federally listed as endangered).

No evidence of ORV use was observed, the lack of such activity likely due to the rocky terrain and steep canyon walls. The riparian area lies within Allotment No. 00561, and grazing activity was judged to be moderate, particularly in and around the spring area itself. The riparian area below the springs was fenced in 1998 to exclude livestock. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed moderate. BLM staff judged the Lobo Canyon riparian area to be in fair condition when they visited it on September 22, 1989, noting its importance as one of the few perennial tributaries of the Rio Cebolla. Following a reassessment on September 30, 1997, they categorized the area as FAR, also identifying the flow as intermittent.

3.13.7 Mora River

The Mora River riparian area is located at 4,860 feet MSL and extends over 1.5 miles (36.3 acres), in the northern part of San Miguel County (Figure 3.6). The source of water for this riparian area, Mora River, is a perennial stream that has cut a deep (600 feet) canyon into underlying basalt and sandstone near its confluence with the Canadian River. The land

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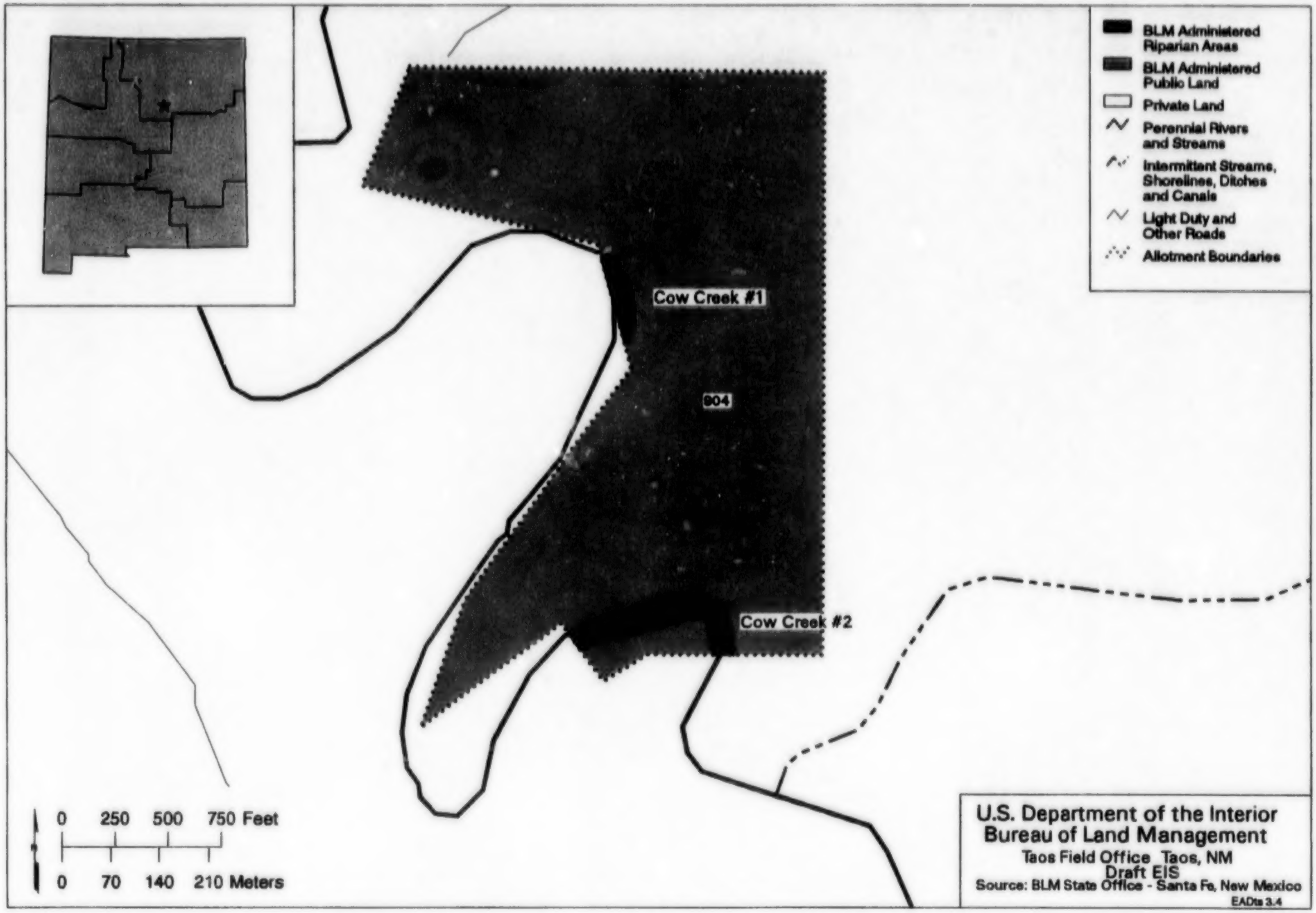
BLM Administered Riparian Areas
BLM Administered Public Land
Private Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Light Duty and Other Roads
Allotment Boundaries
Cow Creek #1
904
Cow Creek #2
0 250 500 750 Feet
0 70 140 210 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.4

FIGURE 3.4 Cow Creek Riparian Areas

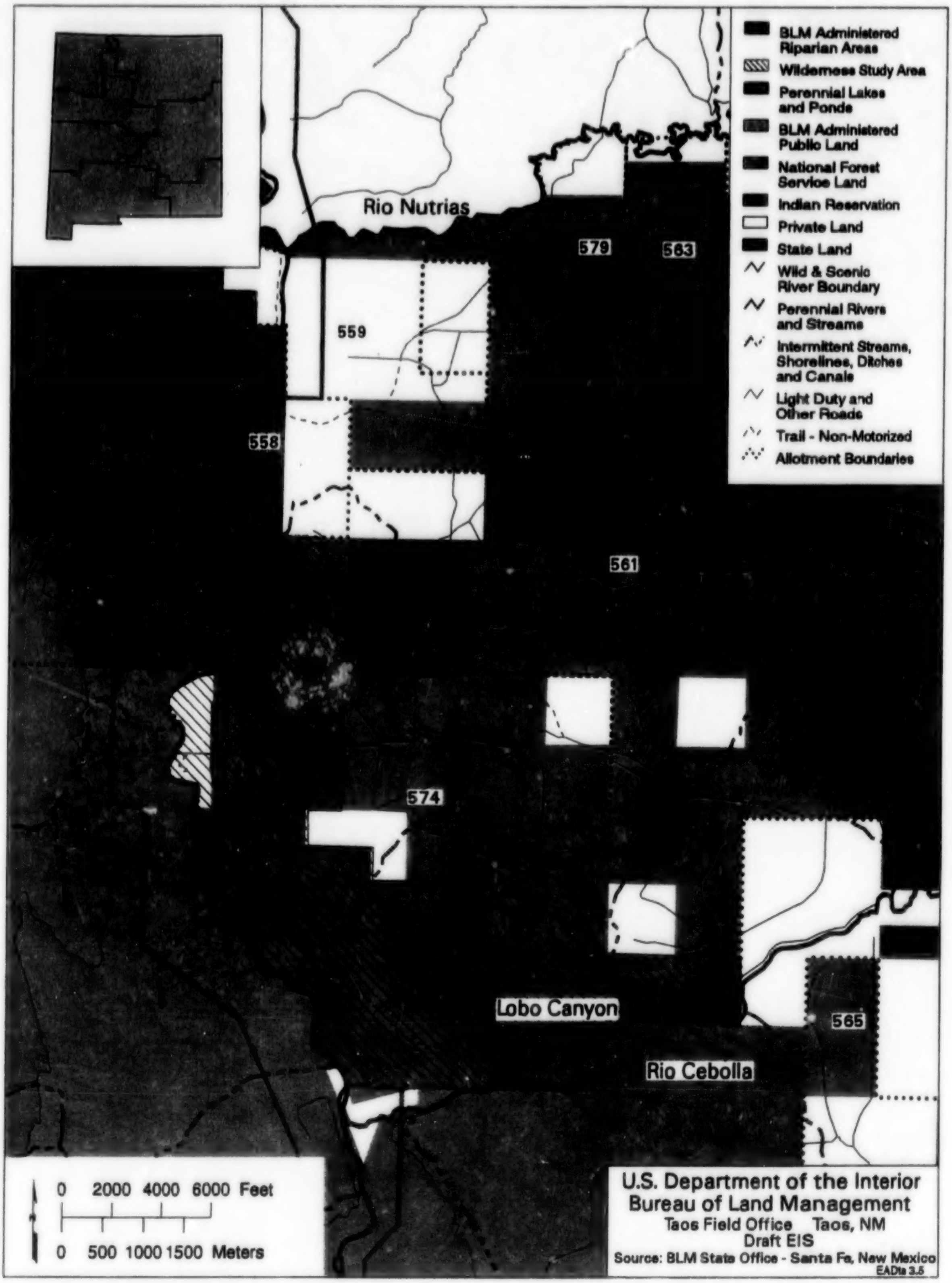
BLM Administered Riparian Areas
▨ Wilderness Study Area
Perennial Lakes and Ponds
BLM Administered Public Land
National Forest Service Land
Indian Reservation
Private Land
State Land
Wild & Scenic River Boundary
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
Rio Nutrias
579
563
559
558
561
574
Lobo Canyon
565
Rio Cebolla
0 2000 4000 6000 Feet
0 500 1000 1500 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.5

FIGURE 3.5 Lobo Canyon, Rio Cebolla, and Rio Nutrias Riparian Areas

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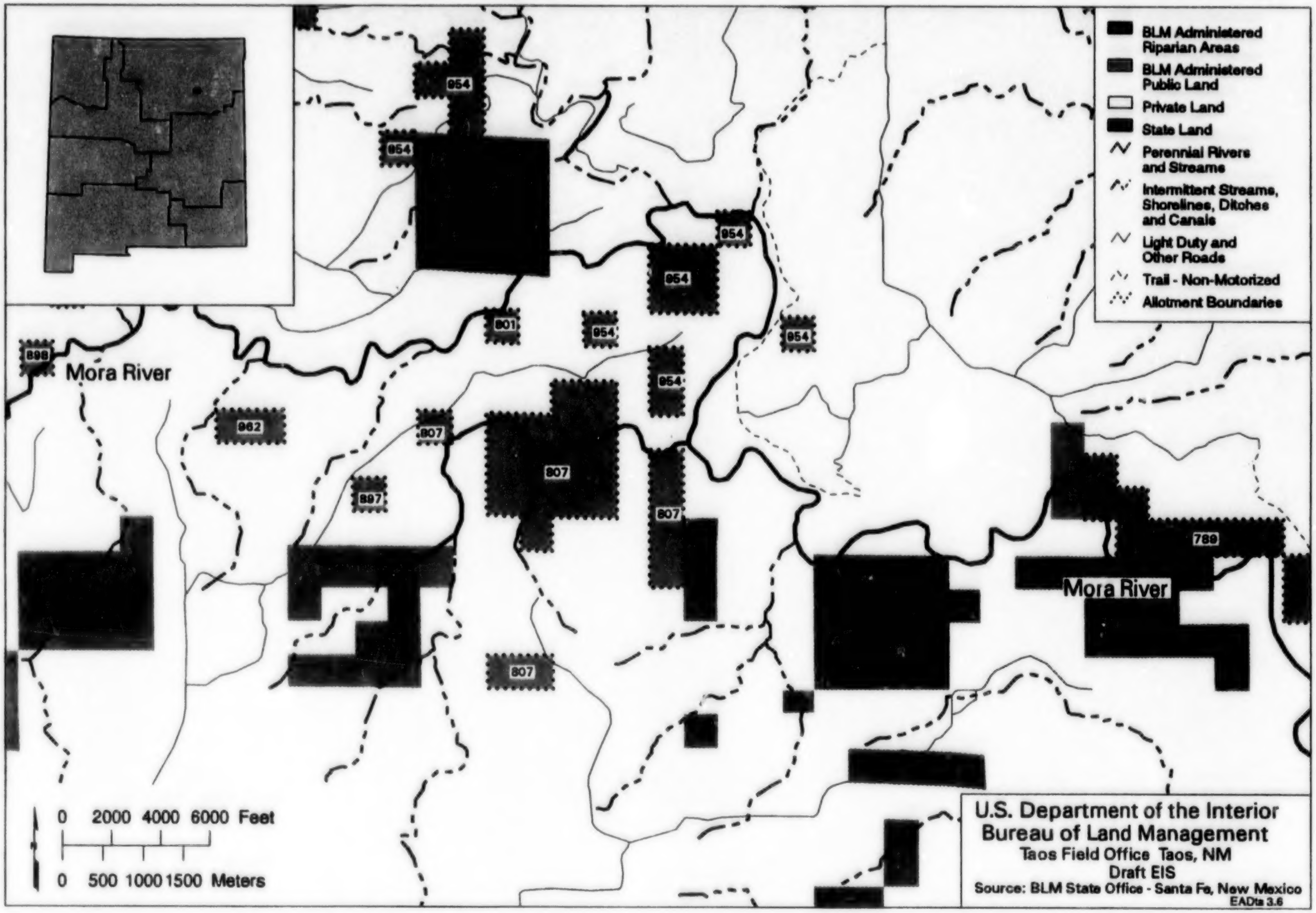
BLM Administered Riparian Areas
BLM Administered Public Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
Mora River
Mora River
954
954
954
954
954
954
954
801
807
807
807
807
962
898
897
789
0 2000 4000 6000 Feet
0 500 1000 1500 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.6

FIGURE 3.6 Mora River Riparian Areas

on one side of the river is administered by BLM (surrounded by private land), and on the other side by the State of New Mexico. Vegetation in the area was classified as grama-buffalo grass 8 (Kuchler Association), with pinyon-juniper woodland, mesquite, and acacia associated. Soil along the streambank was quite rocky. Four barbary sheep also were seen inside the canyon. The Arkansas River shiner occurs within this portion of the Mora River. The riparian area along the Mora River provides winter foraging habitat for the bald eagle and peregrine falcon.

No evidence of ORV use was found, the absence of such activity likely due to the steep sides of the canyon and its rocky bottom. Grazing activity was judged to be moderate, the riparian area composing part of Allotment Nos. 00789 and 00898; and cattle were seen on the canyon floor. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Other possible problems include pollution from agricultural runoff (State of New Mexico n.d.). On a September 26, 1989, visit to the Mora River riparian area, BLM staff classified its condition as good. Following a reassessment on July 8, 1994, they recategorized the area as NF, largely because of grazing impacts.

3.13.8 Manueles Creek

Manueles Creek riparian area is located at 8,600 feet MSL and extends over 0.5 mile (5.5 acres) in southwestern Colfax and northwestern Mora counties (Figure 3.7). The source of water for this riparian area is a small section of Manueles Creek, a perennial stream, and associated land in a much larger stream system. The riparian area and associated land is administered by BLM in a location where many small parcels are owned or administered by many different interests. Vegetation in the area was classified as spruce-Douglas fir forest 20 (Kuchler Association).

The BLM staff found no evidence of ORV use, the absence of such activity likely due to the steep topography in the area. Similarly, they observed no grazing or evidence of grazing, although the riparian area occurs in Allotment No. 00792. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Potential problems include pollution from agricultural and road maintenance runoff (State of New Mexico n.d.). On a June 21, 1989 visit to the Manueles Creek riparian area, BLM staff classified its condition as good, although narrowly avoiding impacts from a proposed state highway project. Following a reassessment on July 8, 1994, BLM categorized the area as in PFC.

3.13.9 Ojo Caliente Riparian Demonstration

The Ojo Caliente Riparian Demonstration Area is located at 6,100 feet MSL and extends over 1.25 miles (325.0 acres) in the southeastern corner of Rio Arriba County (Figure 3.8). The source of water for this riparian area constitutes a perennial stream, although surface water periodically disappears at specific locations during a few weeks from late June through early July. The area and associated land are administered by the BLM, although private tracts and private mining pits border the public land. Vegetation in the area was classified as pinyon-juniper woodland 21 (Kuchler Association), with tamarisk, grasses, and forbs (including western wheatgrass, blue grama, Indian ricegrass, sand dropseed, sixweeks fescue, cheatgrass, little bluestem, and cocklebur), coyote willow, juniper, Russian olive, rubber rabbitbrush, broom snakeweed, and a few surviving cottonwood trees. Wildlife consisted primarily of small species and passerine birds that prefer open space. Soils were sandy with occasional concentrations of river gravel (see also BLM 1986a). The Ojo Caliente Riparian Demonstration Area and the

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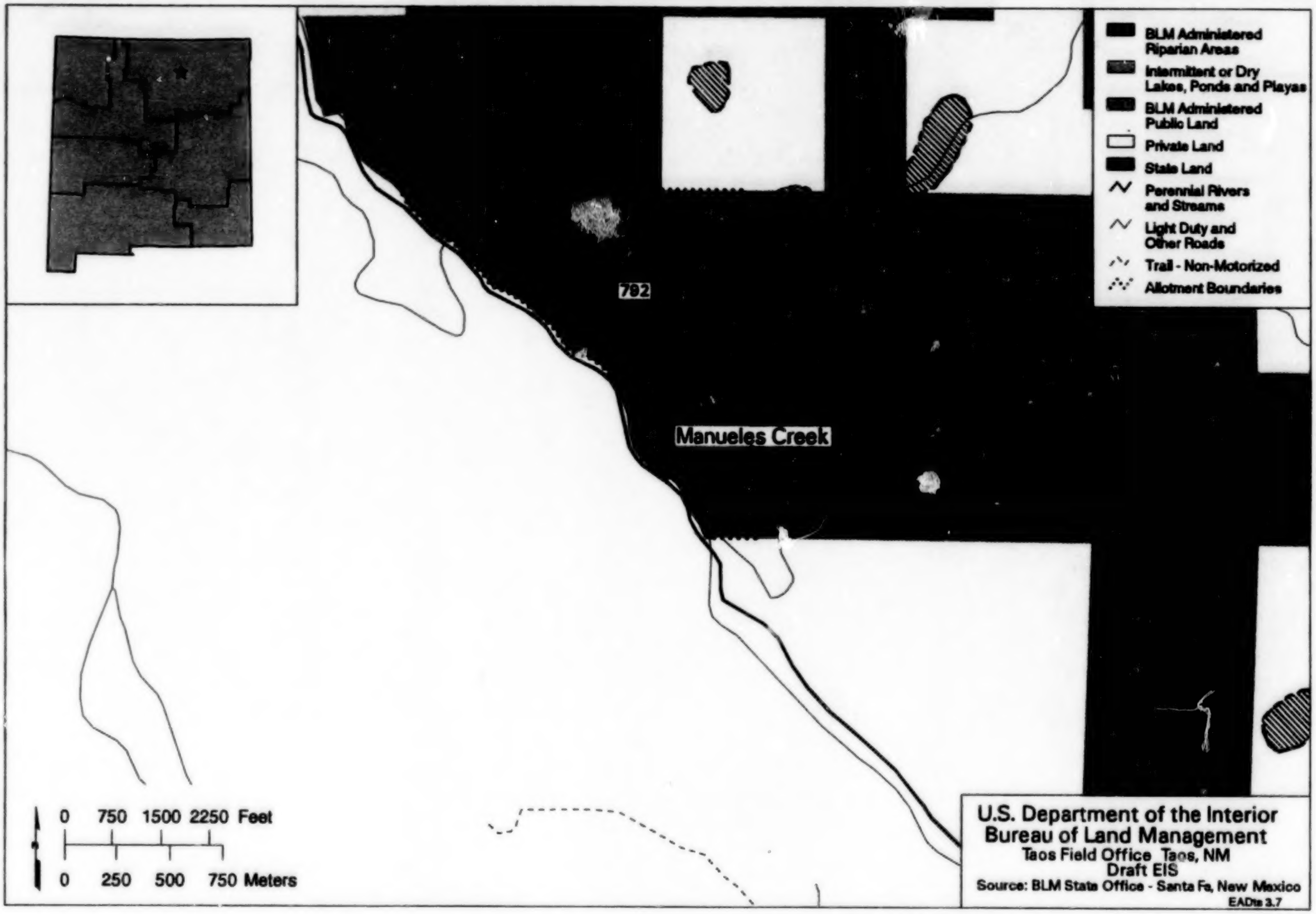
BLM Administered Riparian Areas
Intermittent or Dry Lakes, Ponds and Playas
BLM Administered Public Land
Private Land
State Land
Perennial Rivers and Streams
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
782
Manueles Creek
0 750 1500 2250 Feet
0 250 500 750 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
EADts 3.7

Source: BLM State Office - Santa Fe, New Mexico

FIGURE 3.7 Manueles Creek Riparian Area

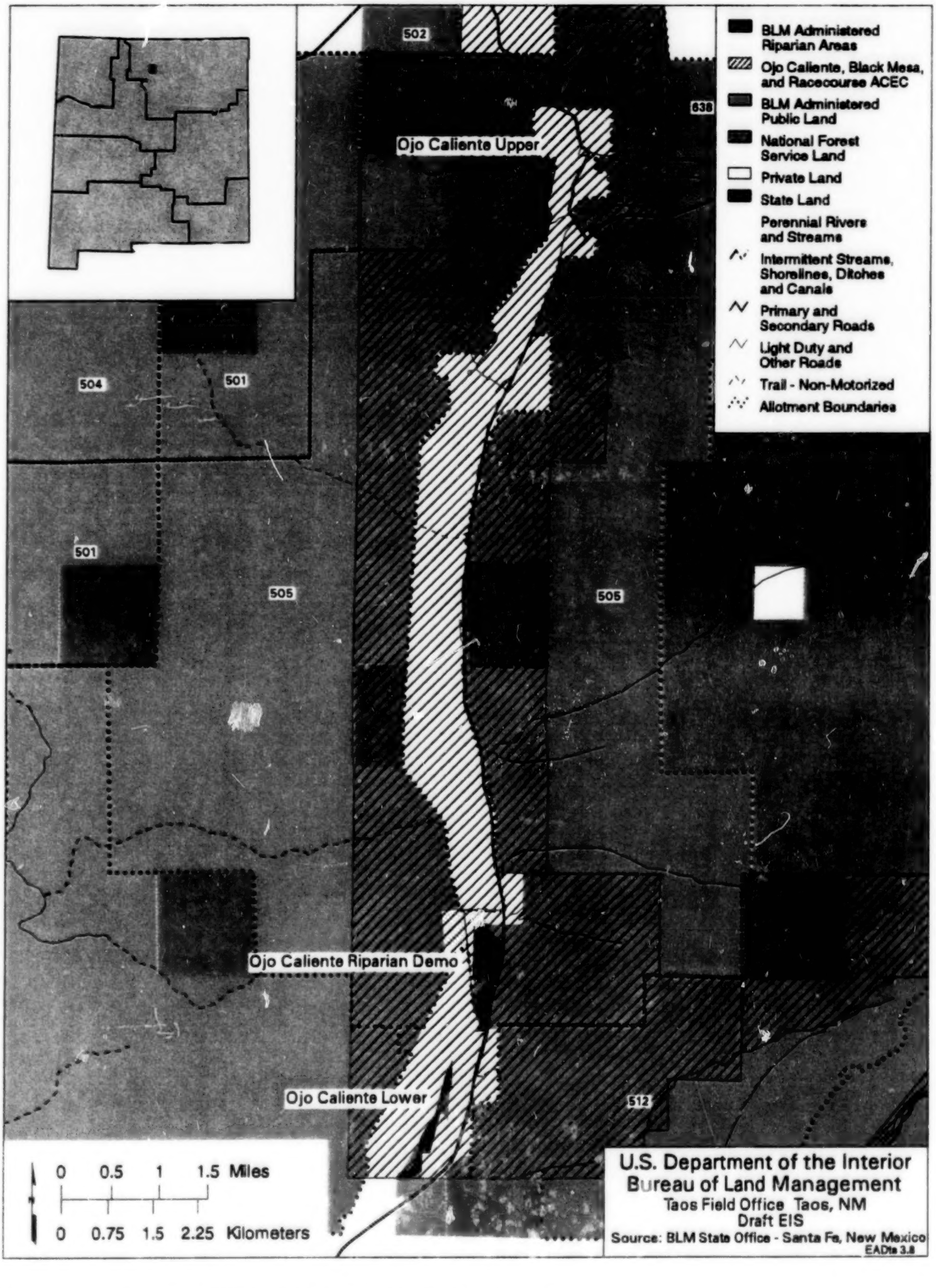
BLM Administered Riparian Areas
Ojo Caliente, Black Mesa, and Racecourse ACEC
BLM Administered Public Land
National Forest Service Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Primary and Secondary Roads
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
502
638
504
501
501
505
505
512
Ojo Caliente Upper
Ojo Caliente Riparian Demo
Ojo Caliente Lower
0 0.5 1 1.5 Miles
0 0.75 1.5 2.25 Kilometers
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.8

FIGURE 3.8 Ojo Caliente Riparian Demonstration Areas

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Ojo Caliente Upper Riparian Area (approximately 7 miles to the north) support potential habitat (in the long-term) for the southwestern willow flycatcher.

Evidence of light ORV use was seen, although before the installation of fences in 1987 ORV use was considerable. The riparian demonstration area lies within Allotment No. 00505. Evidence of grazing was judged to be light, although any grazing is unauthorized and fences were installed during the late 1980s to exclude cattle. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Other potential problems include pollution from agricultural runoff and recreation (State of New Mexico n.d.). In August 1988 BLM classified the condition of the area as poor — due largely to past abuses (ORV use and grazing). About 2 years before, the area was named a demonstration area to evaluate approaches to restore it to functioning condition. No formal reevaluation of its functional condition has occurred, although BLM staff familiar with the area indicate that its condition has improved markedly.

3.13.10 Rio Cebolla

The Rio Cebolla riparian area is located at 6,700 feet MSL and extends over 2.3 miles (8.3 acres) in the east-central part of Rio Arriba County (Figure 3.5). Rio Cebbolla is a small perennial stream that flows into the Rio Chama. The riparian area and surrounding land are administered by the BLM. Vegetation in the area was classified as pine-Douglas fir 17 (Kuchler Association), although pinyon-juniper woodland, Ponderosa pine, willow, and scrub oak also were observed. The Rio Cebolla riparian area supports potential habitat (in the long term) for the southwestern willow flycatcher.

Evidence of light ORV use was noted, occurring along an old road near the stream despite the steep terrain. Grazing was light, controlled in part by the terrain as well as by fences on the eastern section of the riparian area, with a portion of the riparian area itself lying within Allotment No. 00561. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed moderate. Other potential problems include pollution due to agricultural and road maintenance runoff (State of New Mexico n.d.). BLM staff judged the condition of the Rio Cebolla riparian area to be good following a September 22, 1989, visit, emphasizing its perennial quality and the vegetation present. Following a reassessment on July 8, 1994, the area was deemed to be in PFC, with a riparian vegetation zone that had reached its limits.

3.13.11 Rio de los Pinos

The Rio de los Pinos riparian area is located at 8,300 feet MSL and extends over 5.8 miles (77.3 acres) in the northeastern corner of Rio Arriba County (Figure 3.9). Rio de los Pinos is a perennial river bordered by BLM, U.S. Forest Service, State of New Mexico, and private lands. Vegetation in the area was classified as pine-Douglas fir 17 (Kuchler Association). Some erosion and cut banks were noted. The Rio de los Pinos riparian area supports potential habitat (in the long term) for the southwestern willow flycatcher.

The BLM staff noted evidence of light ORV use, primarily associated with the recreational fishing that is quite important in this area. Portions of the riparian area are in Allotment No. 00585. Grazing was light, limited mostly to the private tracts of land within the riparian area. No mining occurred in the area. Other potential problems for Rio de los Pinos in general include pollution from agricultural runoff, road runoff, and recreation. (State of

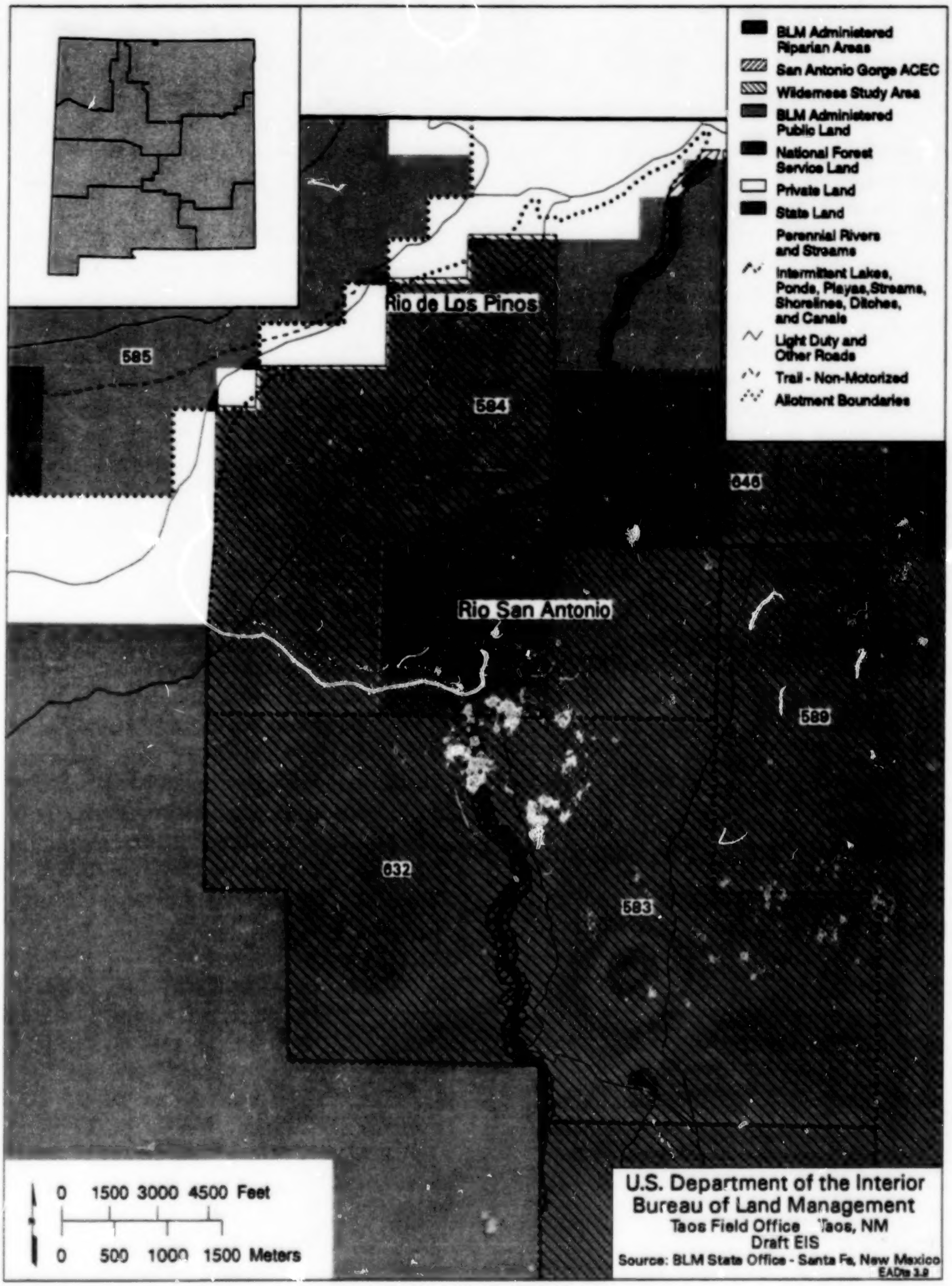
BLM Administered Riparian Areas
San Antonio Gorge ACEC
Wilderness Study Area
BLM Administered Public Land
National Forest Service Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Lakes, Ponds, Playas, Streams, Shorelines, Ditches, and Canals
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
Rio de Los Pinos
Rio San Antonio
585
584
646
589
632
583
0 1500 3000 4500 Feet
0 500 1000 1500 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADrs 3.9

FIGURE 3.9 Rio de los Pinos and Rio San Antonio Riparian Areas

New Mexico n.d.). Despite the large amount of recreation activity that occurred in the Rio de Los Pinos riparian area, BLM staff who visited it on June 19, 1989, classified it as being in good condition. Following a reassessment on July 11, 1994, they reclassified the area as FAR, due largely to the diversion of water upstream.

3.13.12 Rio Medio

The Rio Medio riparian area is located at 6,800 feet MSL and extends over 2.75 miles (36.5 acres) in the northeastern corner of Santa Fe County (Figure 3.10). Rio Medio, the source of water for this riparian area, is a perennial stream that serves as the primary tributary to Santa Cruz Lake. The area and associated land represent a combination of BLM-administered public land and private land. Vegetation in the area was classified as pine-Douglas fir forest 17 (Kuchler Association), with juniper also noted, along with mountain alder, cedar, willow, hackberry, ponderosa pine, cottonwood, oakbrush, Kentucky bluegrass, *Sporobolus* sp. fescue, wheatgrass, Apache plume, wheeler thistle, clematis, dandelion, gooseberry, aster, winter fat, poison ivy, and horsetail. Fauna included trout, with the Rio Medio being regarded as one of the best trout fisheries in northern New Mexico.

BLM staff found no evidence of ORV usage; the potential for such activity is limited because of limited vehicle access. Evidence of moderate grazing was seen; the riparian area is within Allotment No. 00535. Although disturbance of the stream bank was observed, it had not yet affected bank stability. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Following a visit on August 11, 1988, BLM staff made no systematic assessment of the condition of the Rio Medio riparian area, although they noted that it was in "good and stable condition." A reevaluation on July 11, 1994, categorized the area as FAR, the main problem identified as grazing.

3.13.13 Rio Nutrias

The Rio Nutrias riparian area is located at 6,720 feet MSL and extends over 2.5 miles (12.5 acres) in the east-central part of Rio Arriba County (Figure 3.5). Rio Nutrias is a perennial stream that flows through a deep scenic canyon into the Rio Chama about 5 miles south of El Vado Lake. The riparian area itself and surrounding land are BLM-administered public land (southern side of the stream) and private land (northern side). Vegetation in the area was classified as southwestern spruce fir forest 20 (Kuchler Association), with grass and willows present as well. The stream bank showed signs of erosion with high water. Water indicated heavy siltation, also consistent with erosion.

BLM staff found no evidence of ORV use. Grazing activity was judged to be light, with the riparian area including parts of Allotment Nos. 00559 and 00579. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed moderate. Other potential problems include pollution from unknown sources (State of New Mexico n.d.). BLM staff visited the Rio Nutrias riparian area on September 8, 1989, and determined that it was in fair condition, citing problems with erosion associated with flash floods. Following a reassessment on July 11, 1994, they categorized the area as FAR, largely for the same reason. Grazing has since been eliminated from the Rio Nutrias riparian area.

3.13.14 Rio Quemado

Rio Quemado riparian area is at 6,600 feet MSL and extends over 3 miles (32.8 acres) in the southeastern part of Rio Arriba County and

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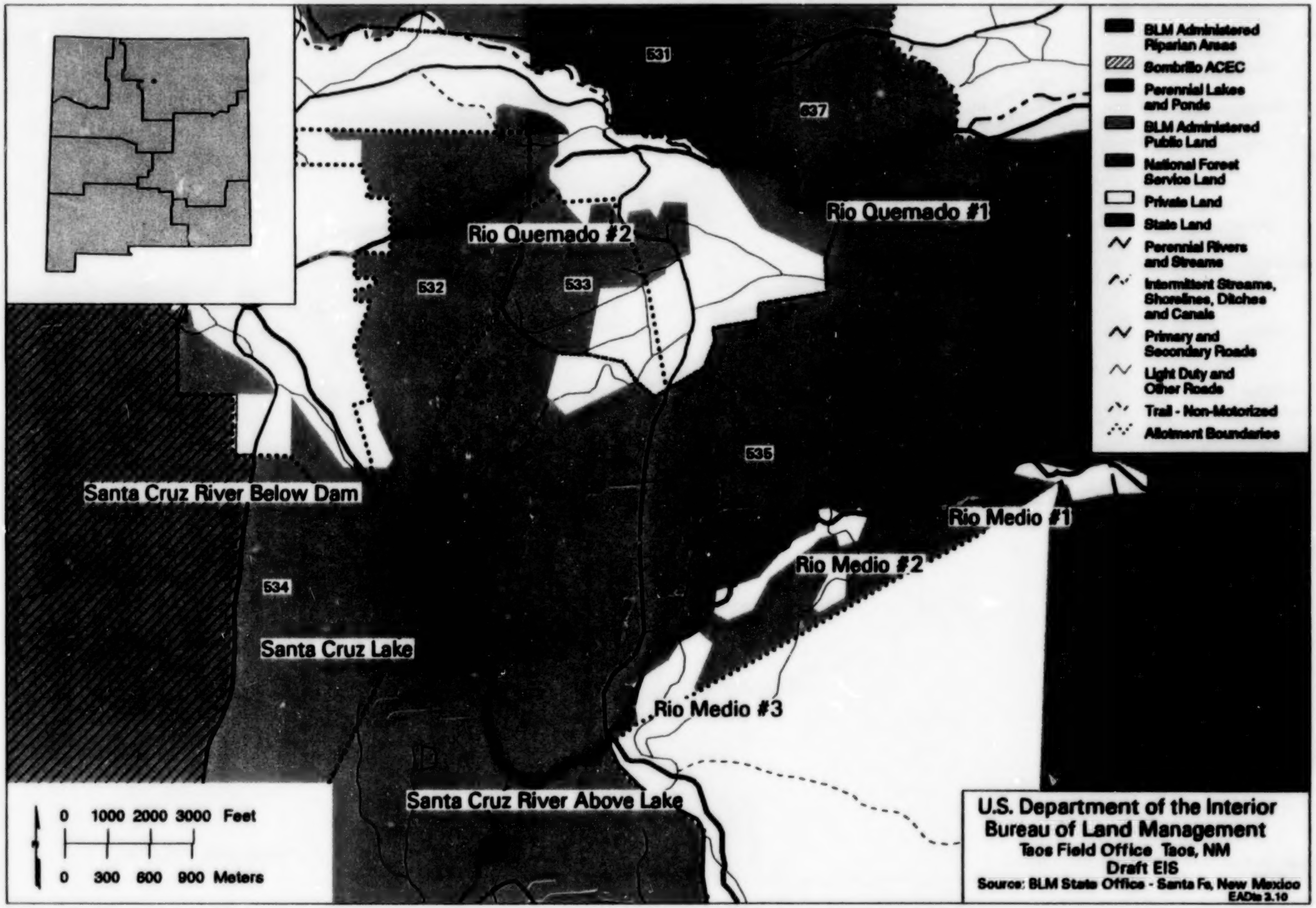
BLM Administered Riparian Areas
Sombrillo ACEC
Perennial Lakes and Ponds
BLM Administered Public Land
National Forest Service Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Primary and Secondary Roads
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
531
537
532
533
535
534
Rio Quemado #1
Rio Quemado #2
Santa Cruz River Below Dam
Rio Medio #1
Rio Medio #2
Rio Medio #3
Santa Cruz Lake
Santa Cruz River Above Lake
0 1000 2000 3000 Feet
0 300 600 900 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
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FIGURE 3.10 Rio Medio, Rio Quemado, and Santa Cruz Riparian Areas

the northeastern part of Santa Fe County (Figure 3.10). Rio Quemado is a small perennial stream. The riparian area, administered by BLM, consists of two small areas separated by a pair of small rural communities. Vegetation in the area was classified as pinyon-juniper woodland 21 (Kuchler Association).

Evidence of light ORV use was found, consistent with the close proximity of the two rural communities located nearby. Grazing activity also was judged to be light, with the riparian area composing part of Allotment Nos. 00637, 00532, and 00535. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. BLM staff visited the Rio Quemado riparian area on June 22, 1989, and determined that it was in fair condition, citing no particularly serious problems. Following a reassessment on July 11, 1994, they categorized the area as being in PFC, noting that riparian vegetation was well established.

3.13.15 Rio San Antonio

The Rio San Antonio riparian area is located at 8,100 feet MSL and extends over 13.2 miles (120.1 acres) in the northeastern part of Rio Arriba County (Figure 3.9). The Rio San Antonio is a perennial stream flowing through a deep gorge. The riparian area itself and surrounding land are administered by BLM. The river and riparian area lie within the San Antonio Gorge ACEC, while the surrounding uplands are included in a wilderness study area. Vegetation in the area was classified as pine-Douglas fir 17 (Kuchler Association), with pinyon-juniper woodland associated. Soil was sandy.

BLM staff found no evidence of ORV use, the riparian area lying in the relatively inaccessible bottom of a gorge. In 1989, grazing activity was judged to be moderate. Although most grazing occurred on the top of the gorge, a lack of water there had caused cattle to make trails into the gorge to gain access to the water at its bottom. In 1995, a series of watergaps was installed to reduce livestock access. No mining occurred in the area. Other problems in the Rio San Antonio in general include pollution from agricultural runoff, silviculture, and recreation (State of New Mexico n.d.). BLM staff visited the Rio San Antonio riparian area on June 19, 1989, and determined that it was in fair condition, citing problems with livestock control. Following a reevaluation on July 11, 1994, they categorized the area as FAR, citing the main problem as dewatering of the stream within the associated watershed.

3.13.16 Rio de Truchas

Rio de Truchas riparian area is located at 6,600 feet MSL and extends over 7.5 miles (1,033.0 acres) in the southeastern part of Rio Arriba County (Figure 3.11). The source of water for this riparian area is Rio de Truchas, an intermittent stream serving as a primary drainage for the Sangre de Cristo range during snow and rain runoff. A perennial spring serves as a tributary and maintains the riparian quality of the area. The riparian area itself and associated land are administered by BLM. Vegetation in the area was classified as pinyon-juniper woodland 21 (Kuchler Association), augmented by a large quantity of sage, an understory primarily of grama grasses (bluegrama, Kentucky bluegrass, and smooth brome), forbs, and shrubs, as well as scattered rubber rabbitbrush, cottonwood, small willows, Gambel oak, skunkbrush, snakeweed, milkseed, snowy aster, cholla, prickly pear, and horsetail. Riparian vegetation has been discontinuous, characterized by patches of riparian communities that open up to areas of raw gravel bar, although recovery has reached a point where there are no gravel stretches without at least a few young cottonwood or willow trees.

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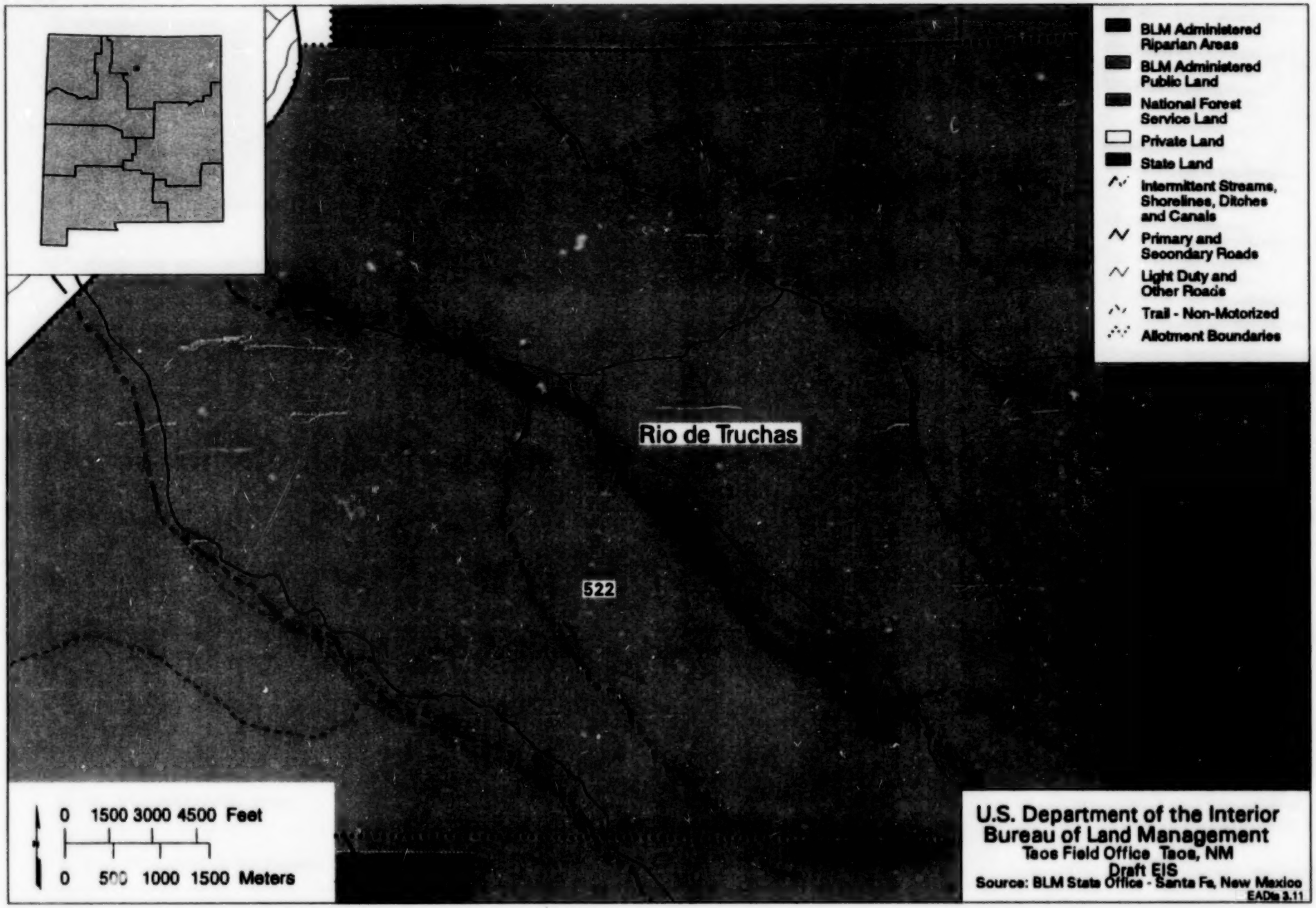
BLM Administered Riparian Areas
BLM Administered Public Land
National Forest Service Land
Private Land
State Land
Intermittent Streams, Shorelines, Ditches and Canals
Primary and Secondary Roads
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
Rio de Truchas
522
0 1500 3000 4500 Feet
0 500 1000 1500 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.11

FIGURE 3.11 Rio de Truchas Riparian Area

Wildlife includes deer, turkey, and a large number of neotropical migratory birds. The Rio de Truchas riparian area supports potential habitat (in the short term) for the southwestern willow flycatcher.

Evidence of moderate ORV use was found, with the lower 0.5 to 0.75 mile of the canyon particularly disturbed (the upper canyon was in much better condition). Livestock were observed in the canyon, with grazing use assessed as moderate as well — the riparian area composing part of Allotment No. 00522. Grazing occurs only during the winter, and the sole rancher who holds a grazing permit has signed an allotment management plan that stipulates the removal of livestock when use levels reach 50% of herbaceous species or 10% of woody species (cottonwood and willow). The lower Rio de Truchas, below the spring, has been used for mineral material sales—notably for state and public sand sales—which has been heavily disturbed. Potential for oil- and gas-related activity is low. BLM staff visited the Rio de Truchas riparian area on September 8, 1988, classifying its condition as fair. Following a reassessment on July 11, 1994, they categorized the area as FAR, due both to the sand and gravel mining mentioned above and upstream diversion of water for irrigation. The riparian area subsequently was closed to sand and gravel removal.

3.13.17 Santa Cruz Lake

Santa Cruz Lake riparian area is located at 6,300 feet MSL and extends over 2.5 miles of shoreline (135.0 acres) in north-central Santa Fe County (Figure 3.10). Santa Cruz Lake is a reservoir formed by damming the perennial Santa Cruz River. The main function of the reservoir is to store water for irrigation, although it also provides a source of recreation. The riparian area itself and associated land are administered by BLM. Vegetation in the area was classified as pinyon-juniper woodland 21 (Kuchler Association), with associated cottonwood, Apache plume, and assorted shrubs varying along the lakeshore. Wildlife included beaver, rainbow trout, German brown trout, and suckers.

Santa Cruz Lake serves as a major recreation area in Santa Fe County. Pedestrian traffic related to fishing has resulted in soil compaction and erosion along the shoreline. No evidence of grazing was observed, although on occasion a stray cow enters the area. The riparian area is part of Allotment No. 00535. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. BLM staff who visited the Santa Cruz Lake riparian area on June 17, 1988, assessed the area as being in poor condition, due in large part to ORV-related damage. However, controls on ORV use have subsequently been successfully implemented. Following a reevaluation on July 11, 1994, BLM staff categorized the area as in unknown functional condition (U), noting that as a reservoir used primarily for irrigation, many of the conventional evaluation criteria do not apply.

3.13.18 Santa Cruz River, Above Lake

The Santa Cruz River, Above Lake riparian area is located at 6,500 feet MSL and extends over 1.0 mile (9.0 acres) in north-central Santa Fe County (Figure 3.10). The source of water for this riparian area is the Santa Cruz River, a perennial stream flowing through the La Caja Canyon and feeding into Santa Cruz Lake. The riparian area itself and associated land are administered by BLM. Vegetation in the area was classified as primarily pinyon-juniper woodland 21 (Kuchler Association), augmented with cottonwood, coyote willow, Ponderosa pine, mountain alder, Apache plume, sand dropseed, Kentucky bluegrass, sideoats, rubber rabbitbrush, clematis, winter fat, mints, cacti, and horsetail. Two waterfalls occur on the river, identified as dam-and-log type. The stream bed is generally sand, large gravel, and cobbles. The Santa Cruz River, Above Lake riparian area supports potential habitat (in the long term) for the southwestern willow flycatcher.

No evidence of ORV use was found, likely because the river flows through a steep-sided canyon. Evidence of grazing was found to be light; the riparian area is in Allotment No. 00535. Little disturbance of the riparian area was attributable to grazing when it was evaluated in the late 1980s, and grazing was excluded in 1998. No mining occurred in the area, and the potential for oil- and gas-related activity was deemed low. Other potential problems include pollution due to agricultural runoff and recreation (State of New Mexico n.d.). BLM staff visited the Santa Cruz River, Above Lake riparian area on July 29, 1989, classifying its condition as fair. Following a reevaluation on July 11, 1994, they categorized the area as in PFC.

3.13.19 Santa Cruz River, Below Dam

The Santa Cruz River, Below Dam riparian area is located at 6,200 feet MSL and extends over 1.0 mile (27.3 acres) in north-central Santa Fe County (Figure 3.10). The source of water for this riparian area is the stretch of Santa Cruz River flowing out of Santa Cruz Lake below the dam that forms that reservoir. The riparian area itself and associated land are administered by BLM. Vegetation in the area was classified primarily as pinyon-juniper 21 (Kuchler Association), augmented with cottonwood, Apache plume, willow, rubber rabbitbrush, poison ivy, Chinese elm, sand dropseed, woolly mullein, prickly pear, cholla, snakeweed, mustard, horsetail, clematis, and hairy golden aster.

BLM staff found evidence of moderate ORV use, primarily by way of a single access road that opens the entire area to such activity. Evidence of moderate grazing also was noted, the livestock having strayed into the area from Allotment No. 00534. No mining occurred in the area, although some large rocks had been removed from the stream bed for construction purposes. The potential for oil- and gas-related activity was deemed low. Other potential problems include pollution from agriculture (State of New Mexico n.d.). BLM staff visited the Santa Cruz River, Below Dam riparian area on July 21, 1988, judging it to be in poor condition primarily because of streambank erosion and the lack of vegetation to protect against such erosion. Following a reevaluation on July 11, 1994, they categorized the area as in FAR condition, largely due to heavy human impact.

3.13.20 Santa Fe River

The Santa Fe River riparian area is located at 5,720 feet MSL and extends over 6.0 miles (32.7 acres) in west-central Santa Fe County (Figure 3.12). The Santa Fe River, the source of water for this riparian area, is a perennial stream. The riparian area itself and associated land are administered by BLM. The riparian area is included in the La Cienega ACEC, which was designated in 1992 (BLM 1995). Vegetation in the area was classified as a combination of grama-galleta steppe 47 and pinyon-juniper woodland 21 (Kuchler Association). The shore of the stream was observed to be rocky and stable. The Santa Fe River riparian area supports potential habitat (in the long term) for the southwestern willow flycatcher.

BLM staff found no evidence of ORV use. Indications of moderate grazing were found, primarily in the form of cattle grazing at the time of observation. The riparian area is part of

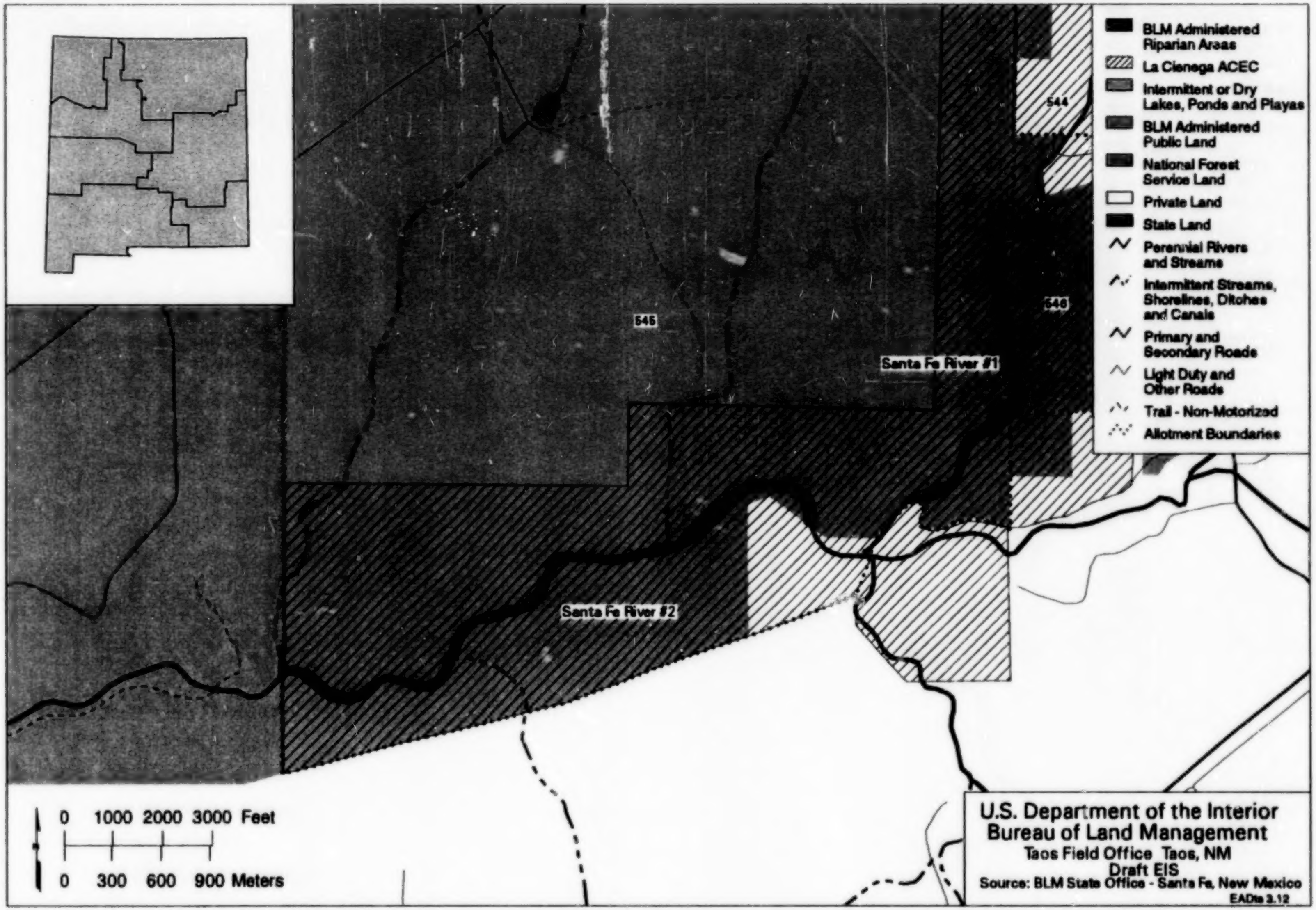
BLM Administered Riparian Areas
La Cienega ACEC
Intermittent or Dry Lakes, Ponds and Playas
BLM Administered Public Land
National Forest Service Land
Private Land
State Land
Perennial Rivers and Streams
Intermittent Streams, Shorelines, Ditches and Canals
Primary and Secondary Roads
Light Duty and Other Roads
Trail - Non-Motorized
Allotment Boundaries
544
545
546
Santa Fe River #1
Santa Fe River #2
0 1000 2000 3000 Feet
0 300 600 900 Meters
U.S. Department of the Interior
Bureau of Land Management
Taos Field Office Taos, NM
Draft EIS
Source: BLM State Office - Santa Fe, New Mexico
EADts 3.12

FIGURE 3.12 Santa Fe River Riparian Areas

Allotment Nos. 00545 and 00546. No mining occurred in the area at the time of assessment in the late 1980s, and the potential for oil- and gas-related activity was deemed low. Other potential problems include pollution from agricultural runoff (State of New Mexico n.d.). BLM staff visited the Santa Fe River riparian area on August 31, 1989, classifying its condition as fair. Following a reevaluation on July 8, 1994, they categorized the area as NF, noting that the uplands lie in the city of Santa Fe and all of the waterflow is effluent from the sewage treatment plant (though augmented by perennial spring seeps in the Cieneguilla Canyon and water from Cieneguilla Creek).

The Santa Fe River riparian area was reassessed in 1995 as a major component of the La Cienega ACEC (BLM 1995). The La Cienega Mesa SMA was expanded in 1992 and designated as an ACEC to incorporate areas with high-value cultural resources. However, BLM also noted that the abundant water (although largely effluent) attracts a great variety of wildlife, especially avian species. Much of the interest in this area relates to its potential to support the reestablishment of riparian vegetation and historic wetland habitats. One of the most important steps in this reestablishment is to increase consolidation of the riparian area through the acquisition of key tracts of private land interspersed with public land. In addition, BLM needed to reclaim cinder pits, develop and implement grazing management plan for the Tetillitas allotment, and implement riparian restoration (removal of certain plant species and planting of others).

4 ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION AND BASIC ASSUMPTIONS

The potential effects of implementing the proposed action to restore and protect riparian habitats are assessed in this chapter in the following order. First the assessment considers the potential effects that implementing each of the three alternatives might have on the resources in and adjacent to the respective riparian areas. In addition, the potential cumulative impacts of other past, present, and reasonably foreseeable future activities are analyzed. This chapter also includes discussions of environmental effects that cannot be avoided should the proposed action be implemented, the relationship between short-term uses of the human environment and the maintenance of long-term productivity, and any irreversible or irretrievable commitments of resources that would be involved by implementing the proposal.

The EIS includes a range of alternatives to accomplish the proposed action. Alternative 1 (Current Management) must be characterized as the No Action Alternative because it is a continuation of current management while Alternatives 2 (Adaptive Management) and 3 (Grazing Management) represent somewhat new or different management approaches. The activities that would occur under any of the alternatives are largely administrative in nature, for example changing use authorizations for livestock grazing, recreational activities, or mineral development. Examples of on-the-ground riparian habitat management activity that could occur would be fencing to exclude livestock from riparian areas; modification or establishment of watering facilities for livestock and wildlife; installation of small structures for streambank modification; and establishment, manipulation, or removal of vegetation. The purpose of the cumulative assessment is to place the analysis of impacts relating to BLM actions in context and perspective with other related activities that can be assumed to occur independently of BLM jurisdiction.

This chapter describes the potential environmental impacts that could occur under each of the three management alternatives being considered: Current Management (No Action Alternative), Adaptive Management (Preferred Alternative), and Grazing Management. (See Table S.1 for a summary of projected outcomes of implementing each alternative.) Section 4.1 discusses management issues (i.e., impacts that prevent riparian areas from achieving a PFC rating and general mitigation that can correct these impacts). The major management issues addressed are grazing, recreation, water developments, and invasive species. In Section 4.2, the analyses for each of the three management alternatives being considered address attainment of PFC for the riparian area, wildlife and species of special concern, cultural and paleontological resources, and socio-economics. Mitigative measures are described in cases when they might be needed to reduce environmental impacts. Sections 4.3 through 4.6 describe, respectively, unavoidable adverse impacts, issues related to long-term productivity and short-term uses, irreversible and irretrievable commitments of resources, and cumulative impacts.

The BLM's riparian management goals and objectives typically fall into one of four general management strategies: (1) maintenance of existing riparian conditions, (2) improvement of degraded riparian conditions, (3) recovery of lost riparian areas, and (4) development of new riparian areas (BLM 1992a). Components of restoration include remodeling the physical aspects of the habitat, remodeling the chemical aspects (e.g., nutrients), and replacing missing species or removing undesirable invasive (e.g., exotic) species (Bradshaw 1996). True ecological restoration is probably impossible because (1) relatively little is known about most historic ecosystems; (2) key species may have become extinct or viable populations may have been lost; (3) physical conditions (e.g., soils and climate) may have changed; or (4) cost and time requirements may make any attempt at true restoration prohibitive (Van Haveren et al. 1997). In addition, adverse conditions may be produced by activities outside of the control of the BLM (e.g., flow regulations in adjacent rivers and streams; grazing practices on adjacent, privately owned lands; and mining and farming activities on private lands within the local watershed).

The riparian management activities instituted by the BLM include a variety of methods intended to protect and enhance riparian areas. These activities include installing fencing, instituting seasonal use by livestock and voluntary nonuse, planting native vegetation, removing exotic species, terracing and contouring, conducting prescribed burning, limiting ORV use, removing or restocking of wildlife, installing hydraulic structures to create point bars or to control erosion, and blasting or digging potholes to serve as water sources for wildlife. Also, land exchanges may be pursued to consolidate public lands in and adjacent to important riparian-wetland habitats. These management actions and land exchanges provide a positive impact by enhancing BLM's surface administration abilities (BLM 1989, 1992a).

Management of riparian areas is a complex undertaking in the Southwest — (1) Most riparian acreage is privately controlled or intermingled with other ownerships; (2) riparian areas are often the primary or only watering places for livestock; (3) public use of riparian areas is increasing; (4) other resource values are concentrated in and dependent on riparian areas; (5) grazing affects a number of resources and uses, both on-site and off-site; (6) the value of properly functioning riparian systems is not widely understood; and (7) traditional management practices are often inadequate and difficult to change (BLM 1997). In addition, BLM-administered riparian areas tend to be small relative to adjacent private lands.

The BLM has prepared several documents applicable to riparian area management, monitoring, and evaluation. Included are *Riparian Area Management, A User's Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas* (BLM 1998b); *Riparian Area Management, Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas* (BLM 1998d); *Grazing Management for Riparian-Wetland Areas* (BLM 1997); *Using Aerial Photographs to Assess Proper Functioning Condition of Riparian-Wetland Areas* (BLM 1996a); *Management Techniques in Riparian Areas* (BLM 1992a); *Greenline Riparian-Wetland Monitoring* (BLM 1993a); *Procedures for Ecological Site Inventory — with Special Reference to Riparian-Wetland Sites* (BLM 1992c); and *Riparian Area Management, Inventory and Monitoring of Riparian Areas* (Myers 1989).

Several documents specific to the Taos Field Office have also been prepared. Many of these reports contain information on riparian habitats or management as a secondary outcome in support of a broader land-management objective. These documents were discussed in Section 2.1.1.

4.1 MANAGEMENT ISSUES

This EIS focuses on four impact areas: riparian vegetation, wildlife and threatened and endangered species, cultural resources, and socioeconomics. BLM management issues that can affect these impact areas include grazing, recreation, water development, and invasive species control. Other factors, such as mining and natural events (e.g., floods and fires), can

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also affect the resources considered; however, the impacts of these other factors are considered to be either negligible (mining activities are precluded in riparian areas) or outside of the control of the BLM (e.g., floods and fires). Each of the management issues is discussed below in terms of general effects on riparian system components and functions. Mitigation activities to either eliminate these effects or reduce their severity are also discussed.

Riparian habitats are among the most ecologically important areas in the Southwest. They are characterized by a high biodiversity (a large number of plant species) and productivity (vigorous plants), in part due to their high soil moisture and fertility levels (Belsky et al. 1999). Riparian zones provide important functions within all ecosystems, but they are especially important in the arid and semiarid lands of the Southwest, where they provide the main source of moisture for many species of plants and wildlife, and the main source of water for downstream biotic and human communities (Belsky et al. 1999).

Vegetation within the riparian zones under the administration of the Taos Field Office consists of such species as cottonwoods, willows, Russian olive, saltcedar (tamarisk), horsetail, rabbitbrush, cheatgrass, and herbaceous dicots (e.g., cocklebur, poison ivy, and aster). Saltcedar, Russian olive, and willow are important plant species because they are phreatophytes (plants that have their roots in perennial groundwater or in the capillary fringe above the elevation of the water table). However, non-native phreatophytes (i.e., salt cedar) have replaced more desirable native species (e.g., willows) in many riparian ecosystems. The non-native species provide inferior habitat qualities, such as food and nesting cover, and can prevent the establishment of native vegetation.

Livestock grazing, recreation, water development, and invasive species control can affect the vegetation in a riparian zone. The impacts of these factors and their mitigation are discussed in the following subsections.

4.1.1 Grazing

Among the issues facing public land managers in western North America, none has caused more debate than livestock grazing, partly because of the competing economic, social, and conservation interests involved. A complicating factor unique to grazing is that herbivory by native hoofed mammals has historically been a natural element in certain nonforested ecosystems. However, introduction of domestic livestock has greatly increased the impacts of grazing in most of these ecosystems. Historic livestock grazing has been particularly destructive to ecosystems where native grazers such as buffalo were scarce or absent. For example, many grasslands have been degraded into permanent desert scrub lands (Bock et al. 1993). Chaney et al. (1990) noted that the initial deterioration of western riparian systems began with severe overgrazing in the late 19th century. Most recent scientific studies document that livestock grazing continues to be detrimental to stream and riparian ecosystems in the West (see Belsky et al. 1999).

The continued decline in riparian habitats in the West has been attributed, in part, to increased numbers of cattle in western rangelands. Between 1940 and 1990, the number of cattle in the western United States increased from 25,500,000 to 54,400,000 (Trimble and Mendel 1995). During the 1996 grazing year, 1,502,516 animal unit months (AUMs) of grazing were authorized in New Mexico. The long-term projection is expected to be 1,696,981 AUMs (BLM 1999b).

Sheep and cattle are the primary livestock grazed in the West. Sheep prefer to graze slopes and upland areas so, under proper management, they have minimal effects on riparian and stream habitats. However, sheep have been replaced by cattle on many grazing allotments. Cattle prefer to graze streamside riparian environments because these areas are flatter (making them easier for cattle to traverse) and provide water, shade, and more succulent vegetation. Because of this transition to less sheep and more cattle, riparian areas now receive heavier grazing pressure (Platts 1991). Cattle can cause more damage to riparian zones than their often small numbers would suggest. They spend 5 to 30 times more time in riparian zones than would be predicted from surface area alone (Belsky et al. 1999). Even if just a few livestock drift back or reenter a previously grazed riparian pasture through faulty fences or ineffective natural barriers, they can quickly undo any progress that deferment, rest, or other riparian management practices might have accomplished (BLM 1997b).

The effects of overgrazing on streambanks can include (1) shearing of streambank soils; (2) increases in water and wind erosion of exposed streambanks and channel soils because of a loss of vegetative cover; (3) caving-in of streambanks from animal pressure; (4) reductions in streambank undercuts; (5) formation of wider and shallower stream channels; (6) lowering of water tables; (7) increases in streambank slopes; (8) increases in summer stream water temperatures; (9) increases in streambank instability; and (10) increases in suspended solids (Platts 1991; Bock et al. 1993).

Livestock can also alter riparian vegetation by (1) compaction of soil, which increases runoff and decreases water availability to plants; (2) removal of vegetation, which allows soil temperatures to rise, thereby increasing evaporation; (3) physical damage to vegetation by rubbing, trampling, and browsing; (4) increased dependence on shrubs for forage; and (5) altering the growth form of plants by removing terminal buds and stimulating lateral branching (Myers 1989; Fleischner 1994; Saab et al. 1995). Other effects of grazing on riparian vegetation include changes in species composition; decreases in plant vigor; changes in timing and amounts of organic energy leaving the riparian zone; decreases in canopy cover; reductions of vegetation hanging over and into the water column; creation of conditions that favor exotic species (e.g., saltcedar); and reduction or alteration of the vertical and horizontal components of the tree, shrub, and herbaceous layers (Minshall et al. 1989; Platts 1991; Knopf 1996).

Impacts from heavy grazing vary from moderate to extreme, depending on whether grazing occurs seasonally or yearlong (Ohmart and Anderson 1986). Summer use of riparian zones, for example, is particularly damaging because of severe trampling and mechanical damage, soil compaction, and consumption of plants (Kauffman and Krueger 1984; Platts 1991; Saab et al. 1995). Moderate late-fall or winter grazing may have relatively less impact (Sedgwick and Knopf 1987, 1991). In late fall and winter, water levels are typically low, stream banks are dry, and vegetation is dormant; thus minimizing the effects of trampling, soil compaction, erosion, and browsing (Rauzi and Hanson 1966). However, cattle will concentrate in riparian areas in the fall, because adjacent upland vegetation is drier and less palatable than riparian vegetation. As herbaceous cover is depleted, livestock will shift to browsing riparian shrubs (especially willows) before leaf drop, reducing residual cover needed for stream bank maintenance during subsequent high spring flows (see Bock et al. 1993).

Although riparian vegetation may prove resilient in the presence of livestock for several years, over the long term, vegetation species composition, structural diversity, width of the riparian zone, and succession patterns of

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riparian woodlands may be affected by the influence of livestock on the establishment and survival of tree seedlings (Ohmart and Anderson 1986). Plant species that commonly decline with livestock grazing are either damaged by removal of their photosynthetic and reproductive organs or are unable to tolerate trampling or the drier conditions caused by lowered water tables. Plant species that commonly increase with livestock grazing are usually weedy exotic species that benefit from disturbed conditions, upland species that prefer the drier conditions created by grazing, or subdominant species that are released from competition when taller, dominant species are browsed (see Belsky et al. 1999). Livestock further contribute to the spread of exotic plant species by dispersing seeds in fur and dung and by reducing competition from native species by eating them (Fleischner 1994). Grazing can also disrupt ecological succession.

Cattle grazing can alter bird species composition by promoting the invasion of a site by ecological generalists and thereby eliminating rare species (Knopf 1996). Birds least impacted by grazing are habitat generalists, tree canopy nesters, cavity nesters (vs. open-nesters and ground nesters), insectivores (vs. nectarivores and omnivores), and/or short-distance migrants (Saab et al. 1995). Table 4.1 shows neotropical species' response to grazing impacts. Ground nesting birds are probably more severely affected by overgrazing than any other group of wildlife (Holechek 1981). Given the ubiquity of grazing in the West, species dependent upon lush ungrazed ground cover are at risk and doubtless already are at population levels far below historical levels (Bock et al. 1993). Grazing is rarely considered to have a major direct effect on populations of aquatic birds but may indirectly affect their food base by altering water quality. Livestock grazing affects raptors primarily by influencing the abundance and availability of their prey populations (Knopf 1996).

Most neotropical migratory birds adversely affected by livestock grazing are species that (1) nest and/or forage in heavy shrub or herbaceous ground cover; and/or (2) are especially susceptible to nest parasitism by the brown-headed cowbird (Bock et al. 1993). Riparian neotropical migrants responding positively to grazing include aerial foragers associated with open habitats, ground foragers preferring areas with relatively little cover, or species directly attracted to livestock (e.g., brown-headed cowbird) (Bock et al. 1993).

The impact of livestock grazing on big-game species depends primarily upon the degree of overlap in diets between a given big-game species and the domestic livestock. Moderate or light livestock grazing on rangelands has usually resulted in little competition with big-game species (Holechek 1981).

Most herpetofauna (reptiles and amphibians) are insectivorous and carnivorous and most spend their active periods in shallow water, on the ground, or in trees. Thus, any activity (e.g., livestock grazing) that reduces densities of trees, shrubs, and other vegetation and that reduces insect biomass has to be considered adverse to herpetofauna (Ohmart and Anderson 1986).

Grazing by livestock within riparian areas can also affect water quality and, therefore, affect organisms that occupy portions of streams in the vicinity of grazing areas. Defecation and urination by livestock increase nutrient inputs to watersheds, thereby altering the productivity of aquatic systems. Cattle allowed to wallow within water bodies associated with riparian areas increase water nutrient levels. An overabundance of nutrients can degrade the benthic invertebrate community and the fish community within affected reaches of the river, and if concentrations are high enough, bacteria

TABLE 4.1 Response of Neotropical Birds to the Presence of Livestock

Species Usually Responding Positively to Grazing	Species Usually Responding Negatively to Grazing	Species Unresponsive, or Showing Mixed or Uncertain Responses to Grazing
Killdeer	American kestrel	Mourning dove
Lewis' woodpecker	Calliope hummingbird	Yellow warbler
House wren	Southwestern willow flycatcher	Northern flicker
Mountain bluebird	Cedar waxwing	American redstart
American robin	Yellow-rumped warbler	Eastern kingbird
Brewer's blackbird	MacGillivray's warbler	Song sparrow
Brown-headed cowbird	Wilson's warbler	Gray catbird
Pine siskin	Common yellowthroat	Brown thrasher
	Savannah sparrow	Warbling vireo
	Chipping sparrow	Broad-tailed hummingbird
	Dark-eyed junco	Yellow-breasted chat
	White-crowned sparrow	Red-naped sapsucker
	Lincoln's sparrow	Black-headed grosbeak
	Redwinged blackbird	Rufous-sided towhee
	Northern oriole	Western wood-pewee
	American goldfinch	Western meadowlark
	Cassin's finch	Western tanager

Source: Bock et al. (1993).

associated with the fecal material can present a hazard to public health. Riparian vegetation helps reduce the runoff of water into streams and other bodies of water, and takes up many of the nutrients in the runoff. Thus, it is expected that restrictions on grazing within riparian areas can lead to improved water quality as the amount of riparian vegetation increases.

A recent survey of livestock influences on streams and riparian ecosystems in the West found no positive environmental impacts associated with livestock grazing (Belsky et al. 1999). Nevertheless, grazing has been demonstrated to be a compatible use in riparian areas when it is properly managed in harmony with multiple use objectives, and when the functions of the riparian system, the potential of the site, and the needs of the vegetation guide the development of the grazing management plan. Proper grazing use is defined as "the degree and time of use of current year's growth which, if continued, will either maintain or improve the range condition consistent with conservation of other resources and maintain or improve the quantity and quality of desirable vegetation" (Anderson 1969). Achievement of this condition requires that rangelands not be overgrazed and livestock not be concentrated around available watering sites (Gunnell and Smith 1972).

When grazing cannot be managed in harmony with other uses to achieve land use objectives, restrictions on grazing may be necessary. The extreme position is that livestock grazing should be excluded from western riparian ecosystems wherever possible because of the scarcity of these areas and their importance to wildlife. One reason for this viewpoint is that few wildlife species appear to benefit from grazing by domestic livestock in riparian areas, and those species that do benefit are not restricted to riparian areas (Bock et al. 1993).

Five general factors involved in mitigating grazing impacts are (1) timing, duration, and frequency of grazing; (2) distribution of livestock; (3) stocking rates; (4) utilization levels and patterns; and (5) pasture design (BLM 1997). Successful grazing management strategies utilize a combination of options that (1) limit grazing intensity, frequency, and/or season of use, thereby providing sufficient rest to encourage plant vigor, regrowth, and energy storage and minimize compaction of soils; (2) control the timing of grazing to prevent damage to streambanks when they are most vulnerable to trampling; and (3) ensure sufficient vegetation during periods of high flow to protect streambanks, dissipate energy, and trap sediments (BLM 1997b). In many situations, fencing will be required. In severely degraded areas, the cessation of livestock grazing for 5 years or more, or perhaps permanently, will be necessary to restore natural vegetation and other natural resource values (Behnke 1979).

For less degraded riparian areas, techniques can be utilized to exclude or promote avoidance of riparian areas by livestock. These techniques include (1) installing fencing to control the distribution and/or timing; (2) creating barriers by placing trees and brush on streambanks to discourage use and to help stabilize eroding banks; (3) installing hardened crossings and water access points; (4) performing frequent riding and herding of livestock to control distribution in some situations; (5) siting bedding grounds and other handling facilities away from riparian areas; (6) siting turnouts away from overused riparian areas; (7) establishing gap fencing in conjunction with gullies, cliffs, and other natural barriers to regulate natural trailing or loafing; (8) siting water gaps in rocky areas to minimize trampling damage, and establishing only narrow water gaps to discourage loafing at the water source; and (9) siting water sources and fertilized plots in uplands (Knight 1996; BLM 1997).

Fencing of riparian areas to exclude livestock and establish riparian pastures has been very effective. Many riparian areas respond favorably in the first few years and begin functioning properly (BLM 1992a). Fencing is often the most practical approach for small stream sections and other small riparian areas, such as springs and seeps, located within large pastures that cannot be effectively managed otherwise (BLM 1997). The downside to fencing is its expense, both in terms of construction and maintenance costs and loss of forage available to livestock (Bryant 1982).

Where grazing occurs in riparian areas, growing season rest appears to be the preferred management technique to maintain these areas once they have attained PFC. Generally, dormant season use can result in improvement in the condition of riparian vegetation and in stream bank stability. The best time for livestock use of riparian areas is from late fall (after the plants have established their root and stem reserves for the next growing season) to prior to the peak demand of those reserves for plant growth in the following spring. Thus, the dormant season occurs sometime between November 1 and March 15, depending primarily upon the elevation of the riparian area. The advantages of dormant season use include the opportunity to improve use distribution between riparian and upland areas and to allow herbaceous plant regrowth through the active summer and early fall seasons. Dormant season use of riparian habitats appears to be accomplishing many BLM objectives for riparian restoration and increased diversity of riparian vegetation, including native shrubs and trees (e.g., willows and cottonwoods) (Silva 1998).

4.1.2 Recreation

Recreational activities occurring within riparian areas under the management of the Taos Field Office may include the operation of ORVs, hiking, camping, fishing, bird watching, picknicking, and boating. Potential stresses on riparian systems include destruction or trampling of vegetation, soil disturbance, and removal of materials.

ORV activity is officially restricted to existing roads and jeep trails, unless otherwise designated, on land under the management of the Taos Field Office. However, evidence exists of light to medium unauthorized ORV use within many of the riparian areas managed by the Field Office. ORV use within riparian areas has a high potential for creating adverse effects. On sandy and gravelly soils ORVs can cause displacement of surface soil, which can lead to a loss of vegetation and cause rapid rill and gully erosion. Clay-rich soils are less sensitive to direct mechanical displacement by ORVs, but they do experience higher erosion rates with ORV use compared with natural conditions. ORV use on clay-rich soils can produce considerable surface compaction, thereby reducing infiltration and increasing runoff and the development of gullies.

In general, the use of ORVs on arid lands accelerates the amount and frequency of water runoff, sheet-wash erosion, and sediment yield. In addition to accelerated erosion, continued uncontrolled ORV use can eventually result in irretrievable and/or irreversible commitments of other public land resources. Vegetative vigor and productivity can decline, resulting in the loss of (1) vegetative cover for watershed protection and nongame/small game wildlife habitat, and (2) forage available for big-game wildlife habitat and livestock grazing. Uncontrolled expansion of ORV trail networks could (1) reduce the acreage available for undeveloped recreational opportunities; (2) provide increased access to cultural resources and thus result in increased vandalism and theft; and (3) provide additional access that would facilitate theft of woodland and forest products. In addition, accelerated erosion could expose additional cultural resources to the deleterious effects of wind and water (BLM 1992d).

Potential strategies to mitigate the effects of ORV use in riparian areas include greater monitoring and enforcement of existing ORV restrictions. Areas susceptible to frequent ORV use may be fenced, or other barriers created, to exclude ORVs from the riparian area.

Other recreation activities, such as fishing, hiking, or camping, occurring within riparian areas may result in trampling of vegetation by foot traffic. Such trampling can cause increased erosion potential and reduced riparian functions, such as diffusion of streamflow energy. Camping in riparian areas may also result in the removal of woody material for use as fuel. However, such recreational activities within riparian areas managed by the Taos Field Office generally have not been found to have extensive adverse effects.

4.1.3 Water Developments

Water is a critical element to the health of a riparian area. Without sufficient water at the right times of the year, riparian vegetation would cease to exist. Water for the riparian vegetation in the Taos Field Office area is primarily derived from adjacent streams and rivers; additional water is provided by precipitation and springs. Because of the monsoonal character of rainfall in the arid southwest, most of the precipitation is quickly lost to surface runoff. Similarly, springs may only flow during a portion of the year following storms.

In general, the quantity, quality, and availability of water from nearby streams and rivers is outside the control of the BLM. In the Taos Field Office area, flows in the major rivers of concern are regulated by one dam and two diversions. These facilities store and divert water for downstream irrigation. Flow in ephemeral streams, while uncontrolled by structures, depends on precipitation, surface runoff, and groundwater discharge.

Although water is an essential element for a healthy riparian area, it can also produce adverse impacts through erosion. Streambanks covered primarily by vegetation without extensive root masses can be severely undercut and collapse during periods of high flow. As mentioned above, this type of erosion can be accelerated by the effects of livestock grazing. Collapse of streambanks can decrease the active channel's width/depth ratio and sinuosity, as well as increase stream gradient. This combination reduces a riparian area's ability to dissipate energy (BLM 1998d).

The BLM has initiated several activities intended to reduce streambank erosion and subsequent sedimentation of adjacent surface waters and to provide a continuing supply of water for riparian areas. These measures include the following:

- Planting grasses and other native species on streambanks to reduce erosion caused by flow fluctuations;
- Installing channel structures to store sediment, stabilize channels, raise water tables, and enhance riparian vegetation;
- Blasting or digging potholes;
- Developing springs and seeps;
- Limiting livestock grazing in riparian areas to minimize soil disturbance and promote vegetative growth;
- Restricting ORV use to designated roads;
- Siting, designing, and constructing any adjacent roads in ways that minimize impacts to riparian areas and adjacent waters; and
- Restricting recreation to areas that are not environmentally sensitive.

The availability of sufficient water of good quality is critical in establishing and maintaining wildlife populations. In many instances, the BLM does not have control of upstream conditions that determine the quantity and quality of flowing water. For example, flow variations due to dam releases can produce (1) water shortages that will limit wildlife populations or (2) floods that can inundate nesting birds.

BLM activities described above will also be beneficial to wildlife and threatened and endangered species. In addition, the BLM practice of creating potholes by blasting or digging provides nesting habitat for waterfowl and provides an additional drinking water supply for big-game animals and other wildlife.

4.1.4 Invasive Species

Invasive species typically become established in a biotic community following a

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change or disturbance to ecological conditions and displace more conservative species, often becoming the dominant species and seriously reducing species diversity. Invasive species are usually non-native (exotic) species, but occasionally may include native species. The establishment of invasive, non-native species within riparian areas under the management of the Taos Field Office is adversely affecting the riparian community, the stability of riparian substrates, and hydrological processes. A diversity of vegetation types and structures increases channel complexity and dissipates stream flow energy. Native herbaceous vegetation, such as sedges, rushes, grasses and forbs, capture and filter out fine sediments, while their roots help stabilize banks and colonize newly deposited substrates. The species and structural diversity of combined woody and herbaceous native vegetation improves stream function (BLM 1997).

Exotic plant species that frequently occur as dominant species in riparian-wetland habitats include sweetclover (*Melilotus officinalis*), Russian olive (*Elaeagnus angustifolia*), saltcedar (*Tamarix chinensis*), and redtop (*Agrostis gigantea*) (Durkin et al. 1995). Exotic plant species of the Rio Grande watershed are listed in Table 4.2. Species such as redtop do not have sufficiently developed root systems to withstand high velocity flood flows. The dominance of these species in a riparian community may promote erosion and prevent the maintenance or recovery of riparian areas (BLM 1998b).

Saltcedar infestations both on and off public lands are major impediments to achieving PFC for riparian areas (BLM 1999b). Saltcedar woodlands are common and frequently extensive within the Rio Grande watershed (Durkin et al. 1995). Saltcedar frequently colonizes riparian areas under constant flow conditions on rivers regulated by upstream dams (Szaro 1991). This species may rapidly colonize depositional bars and terraces where scouring flood flows are rare (BLM 1998b). Species diversity is extremely low in saltcedar stands, which occasionally can be impenetrable, although the canopy can be open or closed. Herbaceous species associated with the saltcedar woodlands are typically weedy species that are not riparian obligates. Obligate riparian species generally have a higher erosion control potential because of their sufficiently extensive root mass (BLM 1998b). Few shrubs and grasses occur in dense saltcedar stands along the Rio Grande (Brinson et al. 1981).

Management practices to protect or establish high-quality fish habitat should provide a wide range of plant species and structural diversity, both of which are typically lacking in saltcedar stands (BLM 1997). The lower value to wildlife of saltcedar that dominates the local vegetation in many riparian areas partly accounts for the decreases in density and diversity of riparian-dependent wildlife species. Saltcedar stands have a low habitat value for most riparian bird species. However, some species, including white-winged dove, Bell's vireo, blue grosbeak, black-tailed gnatcatcher, and Gila woodpecker, utilize saltcedar as nesting habitat (Brinson et al. 1981). A species of particular concern on lands managed by BLM, the southwestern willow flycatcher (federal listed as endangered), occasionally nests in saltcedar stands in riparian areas lacking native willow habitat. Management strategies to reduce saltcedar populations include fire, cutting, flooding, and using herbicides and biological controls.

A number of weedy exotic plant species [e.g., dandelion (*Taraxacum officinale*), cheatgrass (*Bromus tectorum*)] that benefit from disturbed conditions have a tendency to increase with livestock grazing (Belsky et al. 1999). Exotic weeds adversely affect native species by altering wildlife habitat and ecosystem processes, such as erosion rates and seasonal

TABLE 4.2 Non-Native Plant Species Known to Occur within the Rio Grande Watershed

Scientific Name	Common Name	Origin
Trees		
Ailanthus altissima	Tree-of-heaven	Asia
Catalpa bignonioides	Southern catalpa	Native to SE U.S.
Elaeagnus angustifolia	Russian olive	Asia
Morus alba	White mulberry	China, Europe
Robinia pseudoacacia	Black locust	Native to SE U.S.
Tamarix chinensis	Saltcedar	MidEast/Mediterranean
Ulmus pumila	Siberian elm	Asia
Graminoids		
Aegilops cylindrica	Jointed goatgrass	Europe
Agrostis gigantea	Redtop	Europe
Agrostis stolonifera	Creeping bentgrass	Europe
Bromus catharticus	Rescuegrass	Eurasia
Bromus commutatus	Meadow brome	Eurasia
Bromus inermis	Smooth brome	Eurasia
Bromus japonicus	Japanese brome	Eurasia
Bromus tectorum	Cheatgrass	Eurasia
Cynodon dactylon	Bermudagrass	Carribean/Mediterranean
Dactylis glomerata	Orchardgrass	Eurasia
Digitaria sanguinalis	Hairy crabgrass	Eurasia
Echinochloa crus-galli	Barnyardgrass	Eurasia
Elytrigia intermedia	Intermediate wheatgrass	Europe
Eragrostis cilianensis	Stinkgrass	Eurasia
Festuca pratensis	Meadow fescue	Europe
Phleum pratense	Timothy	Europe
Poa pratensis	Kentucky bluegrass	Europe
Polypogon monspeliensis	Annual rabbitsfootgrass	Eurasia
Polypogon viridis	Beardless rabbitsfootgrass	Europe
Sorghum halapense	Johnsongrass	Europe
Forbs		
Arctium minus	Lesser burdock	Europe
Asparagus officinalis	Garden asparagus	MidEast/Mediterranean
Brassica nigra	Black mustard	Europe

TABLE 4.2 (Cont.)

Scientific Name	Common Name	Origin
Cannabis sativa	Marijuana	Eurasia
Chenopodium album	Lambsquarters	Europe
Chenopodium rubrum	Red goosefoot	Europe
Cirsium arvense	Canada thistle	Europe
Cirsium vulgare	Bull thistle	Europe
Conium maculatum	Poison hemlock	Europe
Convolvulus arvensis	Field bindweed	Eurasia
Conyza canadensis	Canadian horseweed	MidEast/Mediterranean
Cynoglossum officinale	Gypseyflower	Europe
Datura stramonium	Jimsonweed	South America
Dipsacus fullonum	Fuller's teasel	Europe
Galium aparine	Stickywilly	Europe
Lactuca serriola	Prickly lettuce	Europe
Lepidium latifolium	Broadleaved pepperweed	Europe
Leucanthemum vulgare	Oxeyed daisy	Europe
Marrubium vulgare	Horehound	Eurasia
Medicago lupulina	Black medic	Europe
Medicago sativa	Alfalfa	Europe
Melilotus officinalis	Sweetclover	Europe
Mentha spicata	Spearmint	Europe
Nepeta cataria	Catnip	Europe
Plantago lanceolata	Narrowleaf plantain	Europe
Plantago major	Common plantain	Europe
Polygonum lapathifolium	Curlytop knotweed	Europe
Polygonum persicaria	Spotted ladysthumb	Europe
Rorippa nasturtium-aquaticum	Watercress	Eurasia
Rumex crispus	Curly dock	Europe
Solanum ptychanthum	Nightshade	Europe
Sonchus asper	Spiny sowthistle	Europe
Tragopogon pratensis	Meadow salsify	Europe
Trifolium pratense	Red clover	Europe
Trifolium repens	White clover	Europe
Verbascum thapsus	Common mullein	Europe
Veronica anagallis-aquatica	Water speedwell	Europe

Source: Durkin et al. (1995).

flows (Belsky et al. 1999). Reduction in the abundance or diversity of native species and riparian obligates and their replacement by introduced or upland species reduces habitat quality and the complexity and diversity of biotic communities, and cause a loss of wildlife species such as game (Belsky et al. 1999). Reductions in diversity, population numbers, and productivity of native riparian species generally indicate declining ecosystem health (Belsky et al. 1999). Vegetation community composition in riparian wetland areas must have sufficient diversity to survive large changes in the water table or in the depth to saturated soil (BLM 1998b).

Russian olive forest stands in the Rio Grande watershed are often co-dominated by saltcedar (Durkin et al. 1995). These stands generally have a closed canopy and low species diversity. The forest floor is dry and sparsely vegetated, and the dense foliage may frequently overhang the stream bank and channel.

Cowbirds (*Molothrus* spp.) are native species in New Mexico; however, they are occasionally considered invasive species that may adversely affect the avian community structure. Cowbirds parisitize the nests of other bird species that breed and nest in a variety of habitats, including riparian wetlands. Neotropical migrants are especially vulnerable to cowbird parasitism. Cowbird parasitism may cause a decline in populations of these other species as cowbird juveniles outcompete other nestlings. Cowbirds are attracted to livestock, feeding on insects flushed by livestock movement, and have a tendency to increase in abundance in riparian habitats that are grazed (Belsky et al. 1999). A reduction in cowbird populations within riparian areas may result from management practices that restrict grazing in or near riparian areas.

4.2 IMPACT ANALYSIS

Management objectives for riparian areas administered by the BLM are often directed toward several end uses; however, these end uses may not always be compatible (e.g., wildlife and fish habitat, timber, watershed, oil and gas development, mine operation, livestock grazing, and recreation). Nevertheless, the overall goal of BLM's management process is to protect important or sensitive environmental values, while at the same time allowing development of resources that provide commercial goods and services and that contribute to the social and economic well-being of local communities.

Managing livestock grazing to restore or maintain riparian areas is one of the most pervasive issues facing rangeland managers. Most grazing allotments contain some riparian acreage. However, no single grazing management system would result in consistent recovery of degraded riparian areas. Rather, riparian management needs to be tailored to site-specific conditions, problems, potential, objectives, and livestock grazing considerations (BLM 1997).

The following three sections discuss impacts for the three management alternatives being evaluated in this EIS: Current Management (No Action Alternative) (Section 4.2.1), Adaptive Management (Preferred Alternative) (Section 4.2.2), and Grazing Management (Section 4.2.3). Impacts are evaluated in terms of attainment of PFC, wildlife and species of special concern, cultural and palenotological resources, and socioeconomics.

4.2.1 Current Management

Under the Current Management Alternative (No Action Alternative), the Taos Field Office would continue to administer its riparian areas using guidelines outlined in Section 2.1. Impacts of this management practice are discussed below.

4.2.1.1 Attainment of Proper Functioning Condition

The BLM would continue its management of riparian areas as set forth in the Taos RMP. The goals of this plan are to maintain those areas currently in PFC and improve other areas that are in a degraded condition.

As discussed in Section 3.2, the health of a riparian area is judged by its function, capabilities, and relative potential, with the objective of maintaining or achieving a long-term PFC. A riparian area attains PFC when there is adequate vegetation, stream bends, and, in some cases, large woody debris presents to dissipate stream energy and reduce subsequent erosion, filter sediment, improve water retention, develop root masses that can stabilize streambanks and reduce erosion, and support greater biodiversity.

Regardless of other differences in management objectives, grazing must be compatible with achieving or maintaining PFC to be considered sustainable (BLM 1997). Livestock exclosures would produce positive impacts upon wildlife, watershed, and the riparian/wetland community itself. Ground cover, soil stability, infiltration rates, water holding capacities, shrub and tree regeneration, water quality, and habitat diversity would all increase when livestock grazing pressures are removed. As habitat quality increases, wildlife diversity and density would increase, improving the riparian/wetland ecosystem (BLM 1989).

For a riparian-wetland area to recover or maintain itself, it has to have more than one age class of riparian-wetland plants. It also requires a diverse composition of vegetation (BLM 1998b). Most degraded riparian areas can be restored with native vegetation, given adequate protection and time. The vegetation component of certain streamside habitat types respond more quickly to improved management practices than do other components, such as bank morphology. Thus, the establishment of riparian vegetation speeds up the rehabilitation of other stream and riparian ecosystem components. Therefore, riparian vegetation establishment is a tool that land managers can use to develop better stream and riparian habitats (Platts 1991).

Erosion control, reestablishment of native plant species, and control of the spread of exotic species are part of site stabilization activities. The use of native plant species is a deliberate part of all of the BLM's ecosystem restoration activities (Biederman 1998). Without a change in other management activities (e.g., grazing) to go along with attempts to change vegetative communities, many planting operations would fail. Thus, the causes for the change to the undesired plant community need to be addressed (BLM 1992a). Replacement of saltcedar with valuable forage or browse species would increase the value of the riparian resource (Busby and Schuster 1972). By planting and actively managing native plants, exotic plant colonization can be aggressively countered (Biederman 1998).

Under current management practices, only 4 of the 20 riparian areas (24% of the 17 areas rated from 1994 to 1997; 13% of river miles) under Taos Field Office management (excluding Rio Grande and Rio Chama corridors) have attained PFC. Two of these areas, Rio Quemado

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ground riparian habitat management activity that could occur would be fencing to exclude livestock from riparian areas; modification or establishment of watering facilities for livestock and wildlife; installation of small structures for streambank modification; and establishment, manipulation, or removal of vegetation. The purpose of the cumulative assessment is to place the analysis of impacts relating to BLM actions

lost riparian areas, and (4) development of new riparian areas (BLM 1992a). Components of restoration include remodeling the physical aspects of the habitat, remodeling the chemical aspects (e.g., nutrients), and replacing missing species or removing undesirable invasive (e.g., exotic) species (Bradshaw 1996). True ecological restoration is probably impossible and Santa Cruz River, Above Lake, have shown an improvement from 1989, when they were rated as being only in fair condition. However, five riparian areas (29% of the areas evaluated; 24% of river miles) are classified as NF. Four of these (Canadian River, Carrizo Creek, Mora River, and Santa Fe River) had shown a decline from 1989 to 1994. Cattle grazing is occurring in each of these areas and is likely the greatest factor in the decline of the Canadian River, Carrizo Creek, and Mora River riparian areas.

Overall, a declining trend was seen for six of the riparian areas from the late 1980s to the mid 1990s, while improvement was seen in four of the riparian areas. Grazing and ORV use appear to be factors contributing to a reduction in vegetation cover and promoting erosion in many of the riparian areas. Currently, grazing is potentially, or known to be, contributing to a reduction of riparian function at nine riparian areas under the management of the Taos Field Office. Three riparian areas have been fenced to exclude grazing or ORV use, and grazing has been controlled in three other areas by installing watergaps, modifying permits, or other means. Sand and gravel mining has been closed at one riparian area (Rio de Truchas), which had been rated as FAR, partially due to mining. Hydrological factors are primary concerns at four of the riparian areas (all rated as FAR). Upstream diversion of stream flows has affected two of these areas (Rio de los Pinos and Rio de Truchas), while alteration in hydrological regime in two other areas (Lobo Canyon and Rio San Antonio) may be the result of management activities on adjacent uplands.

Under the Current Management Alternative, grazing, ORV use, and other recreational activities would continue within many of the riparian areas under the management of the Taos Field Office. Vegetation loss and erosion may continue to be factors affecting the condition of these riparian areas, retarding or preventing their development toward attaining PFC. Without frequent monitoring and use of adaptive management strategies, improvement in riparian functions within many of the 20 riparian areas would be difficult. Although the Taos Field Office has taken steps to correct adverse impacts to riparian functions within a number of riparian areas, continuation of current management would be unlikely to succeed in the attainment of PFC for all riparian areas.

4.2.1.2 Wildlife and Protected Species

The objectives of BLM's wildlife management programs are to maintain, improve, and expand aquatic and terrestrial wildlife habitat by coordinating the management of other resources and uses on public lands. The wildlife program includes the protection and recovery of state and federal listed threatened, endangered, and candidate species (BLM 1988). The protection and enhancement of wildlife winter range, aquatic and riparian habitat, and threatened and endangered species are emphasized in program management activities. Some of the limiting factors potentially affecting wildlife populations in riparian areas are not within BLM's control. For example, although BLM has responsibility for the management of wildlife habitat, the animals themselves are often managed by other agencies. Also, natural events (e.g., disease and drought) can severely reduce wildlife populations (BLM 1999b).

One of BLM's management goals for riparian areas is to protect, improve, and enhance riparian habitat for the southwestern willow flycatcher (Silva 1998). In the past, the preservation of a single rare or endangered species initiated habitat restoration activities. More recently, conservation efforts have shifted to the community level because the fulfillment of the needs of one species may not necessarily improve overall habitat conditions. The community approach attempts to return or improve the presence of all ecosystem components (BLM 1991; Biederman 1998). However, habitat restoration aimed at the southwestern willow flycatcher is primarily a community approach for riparian ecosystems, because of the diverse riparian habitat conditions required to meet the bird's nesting requirements. The riparian areas that have been identified as short- or long-term potential nesting habitat for the southwestern willow flycatcher would receive special protection, management, and monitoring. As discussed in Section 3, seven riparian areas under the jurisdiction of the Taos Field Office and within the scope of this analysis have long-term potential habitat for the southwestern willow flycatcher, and one riparian area has short-term potential habitat. Those riparian areas that may develop favorable attributes for threatened or endangered species would receive the same management as those that have a southwestern willow flycatcher initiative.

Riparian management activities being conducted under the Current Management Alternative would achieve the management goal for the southwestern willow flycatcher at a number of riparian areas. The seven riparian areas with long-term potential southwestern willow flycatcher habitat are either fenced to exclude livestock or are scheduled to be fenced as riparian pastures in the next few years. Total livestock exclusion establishes conditions that favor the development of riparian vegetation, including shrubs and trees required for nesting by the southwestern willow flycatcher. Of the seven riparian areas with long-term potential southwestern willow flycatcher habitat, one area (Santa Fe River) is rated NF; one area (Ojo Caliente) was rated poor in 1988 and is improving, although not reassessed; two areas (Rio de los Pinos and Lobo Canyon) are rated FAR. The Rio de los Pinos riparian area had declined between 1989 and 1994, the Lobo Canyon riparian area had remained static, and two areas (Rio Cebolla and the Santa Cruz River Above Lake) are rated PFC. Grazing was excluded from the Ojo Caliente riparian area by fencing in 1987 (although occasional grazing still occurs) and from the Santa Cruz River and Lobo Canyon riparian areas in 1998. The riparian area with short-term potential habitat (Rio de Truchas) is under winter-only grazing management. It is rated FAR, with an upward trend, since 1988.

The BLM's policy is to consider not only federal-listed species, but also state listed and BLM sensitive species in its planning efforts (e.g., BLM sensitive species list, New Mexico Department of Game and Fish animal list, and New Mexico Division of Forestry and Resource Survey plant species list) (BLM 1999b). The BLM uses the following approach in reviewing actions proposed on BLM-administered lands and programs in dealing with threatened, endangered, or other special status species (BLM 1991):

- All proposed actions are analyzed to determine if listed or other special status species or their habitats may be affected;
- ESA Section 7 consultation is initiated where an evaluation indicates a "may affect" situation (either beneficial and/or adverse) for federally listed species or their habitats and the adverse effects cannot be eliminated;
- The BLM initiates an informal conference and may request technical assistance from the USFWS or New Mexico Department of Game and Fish for actions where an evaluation indicates species or their habitats are at

risk and the adverse impacts cannot be eliminated; and

- The BLM ensures that its actions or authorizations would not adversely affect the likelihood of recovery of any listed or other special status species.

Management of special status species would continue consistent with existing RMP decisions and guidance (including results of Section 7 consultation), implementation of AMPs and other activity-level plans (e.g., CRMPs). Under these plans, the BLM would continue to implement grazing systems, construct range improvements to redistribute grazing pressure, and carry out vegetation treatments to improve the ecological status of a particular allotment or pasture of a grazing allotment (BLM 1999b).

Fencing is the primary means used to control livestock use of riparian areas. However, fences can be a source of mortality for birds (Allen and Ramirez 1990). The extent of fence-related mortality is difficult to assess. For an endangered species, even a single death could represent a substantial loss for the population and the species' gene pool. However, the potential hazard of fences is by far outweighed by the realized riparian habitat improvements within fenced areas.

In addition to fencing, several of the riparian habitats have received additional management attention (e.g., invasive species control and/or planting of native woody species) that could further increase the potential of the riparian areas. Waterfowl management is closely associated with riparian management and would slightly improve over the long term with BLM's current emphasis on riparian improvement (BLM 1999b). Waterfowl primarily migrate into New Mexico during the winter along the central flyway (BLM 1999b). Construction of livestock watering tanks and potholes can also improve and create habitats for shorebirds and migratory waterfowl (Gunnell and Smith 1972; Bock et al. 1993). Potholes also provide habitat for reptiles and amphibians.

Three riparian areas, Canadian River, Carizzo Creek, and Mora River, are adjacent to river or stream segments supporting populations of the Arkansas River shiner. Each of these riparian areas was rated as NF in 1994. Although the proportion of riparian habitat under BLM management along these streams and rivers is quite small, there is a potential for soil erosion from these riparian areas and likely a reduced capacity for filtration of stream flows by riparian vegetation. The management objectives for riparian areas within the Taos Field Office area are to restore and improve degraded habitats (Taos RMP). Therefore, under the Current Management Alternative, the Canadian River, Carizzo Creek, and Mora River riparian areas would be expected to improve over time. A long-term improvement of riparian function in these areas may provide a slight benefit for the Arkansas River shiner in adjacent streams and rivers.

Segments of the Canadian River, Carizzo Creek, and Mora River provide winter foraging habitat for the peregrine falcon. Riparian areas under BLM management along these segments were rated as NF in 1994. However, under current management practices, the Canadian River, Carizzo Creek, and Mora River riparian areas would be expected to improve over time. A long-term improvement of riparian function in these areas might in turn provide a slight benefit for the peregrine falcon by improving riparian habitat for wildlife. Habitat improvement may increase the availability of peregrine prey species, which include ducks, shorebirds, and songbirds. Many of these species use riparian habitat for nesting, foraging, or shelter.

Segments of the Canadian River, Carizzo Creek, and Mora River also provide winter foraging habitat for the bald eagle. A long-term improvement of riparian function in these areas might provide a slight benefit for the bald eagle by increasing the occurrence of mature trees within these riparian areas. Bald eagles often use large riparian trees, such as cottonwoods, for roosting.

Appendix A presents a discussion of all protected species that occur in the counties containing riparian areas within the Taos Field Office jurisdiction.

4.2.1.3 Cultural and Paleontological Resources

Impacts on cultural and paleontological resources generally result from some sort of disturbance, be it purposeful or otherwise. Natural processes, such as erosion and landslides, can disturb cultural and paleontological resources, in some cases having a devastating effect. Human activities also can disturb such resources, often with similarly devastating effect (particularly when it is intentional, such as the looting of sites). Other sources of disturbance that are not obviously in the two above categories include grazing, which is made possible through human activity, although it is not directly caused by humans themselves. Each alternative approach to restoring and protecting riparian habitats considered in this EIS has certain implications for reducing the disturbance of cultural and paleontological resources in the region administered by the Taos Field Office.

Current management has as its general objective restoration and protection of riparian ecosystems by allowing selected types of use of riparian areas administered by the Taos Field Office. As discussed elsewhere in this section, this management has resulted in the desired protection or restoration of some riparian areas, often through careful control of livestock access and application of other management practices. Moreover, in riparian areas that feature particularly noteworthy cultural resources, such as the Ojo Caliente, Santa Cruz Lake, and Santa Fe River riparian areas, current management includes provisions specifically directed toward the preservation of cultural resources.

Although their ultimate impacts are uncertain, two activities associated with current management may threaten cultural and paleontological resources: continued grazing and ORV use. Both of these activities, which in some cases have damaged riparian areas in the region in other ways, can lead to adverse impacts to cultural and paleontological resources exposed to their effects. Noteworthy impacts from other human activities are unlikely, primarily because activities with greater potential for damaging cultural and paleontological resources, such as mining, are rare in the region administered by the Taos Field Office. Erosion is the natural process with the greatest potential impact on these resources occurring in riparian areas in the region. Although erosion continues to be a problem in some riparian areas, one aim of current management is to reduce its effects as part of restoration to PFC. As a result, the impacts of erosion, both natural and erosion induced through grazing, ORV use, or other human activities, should be reduced or eradicated through the continuation of current management practices.

4.2.1.4 Socioeconomics

Although an assessment of socioeconomic impacts typically concerns a broad range of effects on the human inhabitants of a particular area, in the present context all other potential socioeconomic impacts pale in comparison with those associated with the livestock industry. As documented in Section 3.6, the livestock industry provides substantial revenue both to the State of New Mexico as a whole and to the nine counties where the riparian areas administered by the Taos Field Office are located.

Current management of riparian areas in the region administered by the Taos Field Office allows for grazing on selected areas on a total of 12 different allotments. Measured in terms of acres of pasture, the contribution of this land to the livestock industry in New Mexico is minimal, about 5,600 head of livestock (roughly 0.1% of the state total) in a state that supported 4.6 million head of cattle and 282,000 sheep on January 1, 1998 (USDA 1999). Assessed for the nine counties that compose the Taos Field Office area, the contribution of BLM-administered riparian areas to total livestock grazing also would be small (about 1.4% of the total for the counties that contained the areas in 1997, see Section 3.6) — in part because of the limited amount of land that riparian areas contributed to grazing allotments and in part because many of the BLM-administered riparian areas consists of small, dispersed holdings. Note that the contributions of allotments associated with the BLM-administered riparian areas are for the entire allotments, not solely for the riparian areas managed by the BLM (which in all cases are considerably smaller than the allotments and hence would contribute much less to the livestock industry).

Measured in terms of vegetation and water, two resources that are relatively scarce in the semiarid Southwest, the contribution of this land is slightly greater, although limited once again by the size and distribution of holdings. In recent years, grazing has declined on BLM-managed riparian areas in the Taos Field Office region, largely because of agency effort to improve the condition of these areas. Thus, the contribution of BLM-administered riparian areas to the grazing economy of the State of New Mexico in general and northeastern New Mexico in particular is small but probably disproportionately important because of the certain resources it provides.

A second consideration in assessing socioeconomic impacts with regard to grazing is the long-held practice of private access to public pasture. Although at first glance this issue may appear to encompass purely economic concerns, the practice has its roots in the sociocultural past of Hispanic colonization in New Mexico and has been discussed in terms of its role in the region's current sociocultural system (Meyer 1998). Once again, however, the limited contribution of BLM-administered riparian areas to the public land and resources used by the livestock industry in the Taos Field Office area suggests a similarly limited role of these areas to the sociocultural fabric of northern New Mexico.

Implementation of the Current Management Alternative (the No Action Alternative) in the Taos Field Office-administered region would continue to make portions of selected BLM-managed riparian areas available for grazing. As a result, the current contribution of this land and its resources to the grazing economy, although limited, would persist.

As a final consideration, environmental justice focuses on whether minority or low income populations suffer high and adverse impacts that are disproportionate to those experienced by the population as a whole. Present analyses indicate neither high and adverse nor disproportionate impacts to minority or low income populations.

4.2.2 Adaptive Management

Under the Adaptive Management Alternative (the Preferred Alternative), the Taos Field Office would assign the highest priority to implementing those management practices identified in the management guidance that would be most beneficial to protecting and restoring the riparian habitats under the administration of the BLM. Thus, riparian management would receive priority attention and action independent of other Taos Field Office business requirements or work tasks. Implementation of this alternative would involve the following steps:

- Surveying and analyzing riparian conditions on a regular basis,
- Adopting management actions,
- Monitoring the progress of the management activities, and
- Modifying the management action, if necessary, on the basis of monitoring results.

Anticipated impacts of the Adaptive Management Alternative are evaluated in the following subsections in terms of attainment of PFC, wildlife and species of special concern, cultural and palenotological resources, and socioeconomics.

4.2.2.1 Attainment of Proper Functioning Condition

The goals of the Adaptive Management Alternative are to maintain those areas currently in PFC and restore the other areas to that condition.

Best management for riparian-wetland areas would be achieved, in part, by implementing procedures detailed in BLM's Riparian Area Management Technical Reports (TRs). The general riparian management techniques outlined in *Management Techniques in Riparian Areas* (TR 1737-6) (BLM 1992a) include (1) fencing, (2) prescribed burns, (3) forestry practices, (4) vegetation plantings, (5) opportunities from mineral activities, (6) structures, (7) beaver, (8) bank stabilization, (9) recreation planning, and (10) road construction and maintenance. Key management considerations outlined in *Grazing Management for Riparian-Wetland Areas* (TR 1737-14) (BLM 1997) include (1) timing, duration, and frequency of grazing; (2) distribution of livestock; (3) stocking rates; (4) utilization levels and patterns; and (5) pasture design.

Livestock grazing within riparian areas may not always be compatible with other resource uses or values. Special livestock management techniques must be applied where soils are unstable, the vegetation complex is fragile, listed species are affected, aquatic or recreation values are high, and municipal watersheds are involved. In some cases, excluding livestock grazing (at least for a time) may be the most logical and responsible course of action (BLM 1997).

Adaptive management practices for livestock grazing that have been used on public lands include reducing livestock, redistributing livestock (by use of fences, wells, salting, etc.), modifying grazing seasons, using rangeland treatments to improve condition (brush control, seeding, etc.), and modifying treatments to reduce soil disturbance (BLM 1999b). In the long term, implementation of adaptive management practices for riparian areas would promote reductions in erosion and sediment production from public lands and slowly improve water quality. The amounts of sediment, nutrients, salts, and biological contaminants in the water would decline (BLM 1999b).

The BLM has initiated management strategies to improve riparian habitats within its jurisdiction while also making allowances for other uses of these areas (e.g., grazing). Many of the management strategies aimed at improving riparian habitats have been shown to be effective. For example, dormant season grazing systems for riparian habitats appear to be accomplishing BLM's objectives for riparian restoration, including increased willow and cottonwood sprouting, increased density of native shrubs and trees, and increased diversity of riparian vegetation (Silva 1998).

Successful grazing management strategies for riparian areas can usually be achieved using a combination of options that:

- Limit grazing intensity, frequency, and/or season of use, thereby providing sufficient rest to encourage plant vigor, regrowth, and energy storage and minimize compaction of soils;
- Control the timing of grazing to prevent damage to streambanks when they are most vulnerable to trampling; and
- Ensure sufficient vegetation during periods of high flow to protect streambanks, dissipate energy, and trap sediments (BLM 1997).

Techniques that attract livestock away from riparian areas include the following:

- Providing water developments in upland areas that lack water (even water developments, such as ponds, or troughs, within riparian areas can reduce streambank trampling damage);
- Planting palatable forage species on depleted upland areas;
- Conducting prescribed burning, which often enhances forage production, palatability, and upland use; and
- Placing hay, salt, grain, molasses, and other supplements only in upland areas.

Techniques that exclude livestock from, or promote avoidance of, riparian areas include:

- Installing fencing, which can be an effective tool for controlling livestock distribution;
- Forming barriers by placing trees and brush on streambanks, which may discourage livestock use and help stabilize eroding banks (placement of boulders along streambanks where livestock trail and cause trampling damage may also be beneficial);
- Installing hardened crossings and water access points that are gravel pads that provide livestock sure footing on a gentle grade to water, either for crossing or drinking;
- Performing frequent riding and herding, which can effectively control livestock distribution in some cases;
- Placing bed grounds and other livestock handling facilities away from riparian areas;
- Placing livestock turnouts far away from overused riparian areas;

- Installing gap fencing in conjunction with gullies, cliffs, and other natural barriers to regulate natural trailing or loafing in some riparian areas; and
- Placing water gaps in rocky areas to minimize trampling damage to streambanks and streambeds (narrow water gaps discourage livestock from loafing at the water source) (BLM 1997).

Identifying systems in PFC allows local managers to assess why these systems have fared well in the past and to possibly use them as models for recovery of similar systems (BLM 1998b). With a change in management techniques, most riparian-wetland areas can achieve PFC within a few years, but some riparian areas could take years to achieve an advanced ecological status (BLM 1998b).

Several of the BLM technical reports for riparian area management provide procedures for inventorying and monitoring riparian-wetland areas to assess their condition before, during, and after application of management techniques to determine the condition of the riparian area. Monitoring is necessary to determine if the riparian-wetland area is progressing towards or maintaining PFC or whether changes in management strategies may be required to achieve PFC. The technical reports that focus on inventory and monitoring include *Riparian Area Management, Inventory and Monitoring of Riparian Areas* (TR 1737-3) (Myers 1989); *Procedures for Ecological Site Inventory — with Special Reference to Riparian-Wetland Sites* (TR 1737-7) (BLM 1992c); *Greenline Riparian-Wetland Monitoring* (TR 1737-8) (BLM 1993a); *Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas* (TR 1737-11) (BLM 1994a); *Using Aerial Photographs to Assess Proper Functioning Condition of Riparian-Wetland Areas* (TR 1737-12) (BLM 1996a); *Observing Physical and Biological Change through Historical Photographs* (TR 1737-13) (BLM 1996b); and *Riparian Area Management: A User's Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas* (TR 1737-15) (BLM 1998b). [Technical Reports TR 1737-11 and TR 1737-15 replace the earlier Technical Report 1737-9 (BLM 1993b) entitled *Process for Assessing Proper Functioning Condition.*]

Under the Adaptive Management Alternative (the Preferred Alternative), the riparian areas under the management of the Taos Field Office would be expected to continually improve and, over time, eventually attain PFC. As other uses of riparian areas were controlled or eliminated, native riparian vegetation would be expected to become well established throughout the riparian zone. Currently, grazing is potentially, or known to be, contributing to a reduction of riparian function at nine riparian areas under the management of the Taos Field Office. The use of ORVs within riparian areas is contributing to a reduction of riparian function at four riparian areas. With the establishment of riparian vegetation, erosion, which is a concern in at least six riparian areas, would be expected to decrease as streambank soils became stabilized. Under the process of natural succession, coupled with the active control of invasive species, riparian vegetation communities would support a diversity of native herbaceous and woody riparian plant species.

Several factors, however, may adversely affect the development of riparian areas toward PFC. Hydrological impacts of upstream diversions or management of upland areas may continue to restrict the development of riparian communities in four riparian areas. In addition, the functions associated with the riparian area along Santa Cruz Lake would continue to be heavily influenced by the primary uses of the reservoir — irrigation and recreation. Reduced water quality, resulting from agricultural runoff, recreation, or sewage treatment effluent, may presently be reducing riparian function in eight riparian areas. However, areas currently rated as PFC, such as Manueles Creek, Rio Cebolla, and the Santa Cruz River, Above Lake, are also subjected to lowered water quality from agricultural runoff and other sources.

4.2.2.2 Wildlife and Protected Species

Under the Adaptive Management Alternative, vegetation communities within riparian areas under the management of the Taos Field Office would develop a diversity of native herbaceous and woody riparian species. Habitat value would subsequently increase for many riparian-dependent wildlife species, and the sizes and diversity of wildlife populations would be expected to increase.

Under this alternative, current management practices that would benefit potential southwestern willow flycatcher nesting habitat would continue (see Section 4.2.1.2). Additional management actions would be instituted at these riparian areas. Also, management actions would be implemented at the riparian areas with designated potential nesting habitat for which no tasks or projects have been completed. Additionally, invasive species would be controlled and native woody species would be planted.

Additional or alternative management activities that would be conducted at the riparian areas with potential southwestern willow flycatcher habitat that are currently managed include redesignating areas as riparian enclosures and removing the areas from the grazing allotment base, developing upland water sources to replace the need for water gaps between riparian exclosures, acquiring adjacent non-BLM lands to better manage and/or increase the extent of contiguous riparian habitats, creating point bars to improve riparian habitat and hydrologic conditions, controlling invasive plants and planting native woody species at locations where such activity is not currently being conducted, and supporting the beaver populations where present (Miller 1999).

Improvement of riparian habitat function as a result of the implementation of this alternative would include the reduction of soil erosion from riparian areas and increased filtering of stream flows. Reduced erosion and increased filtering would potentially contribute to improvement in water quality of associated streams. This increased quality would in turn be expected to be slightly beneficial to the Arkansas River shiner, which is threatened by water quality degradation, among other factors. Because of the small proportion of riparian habitat under BLM management along the streams supporting the Arkansas River shiner, the contribution to water quality improvement would be expected to be quite small. Increased riparian species diversity, structural diversity, and productivity resulting from implementation of this alternative would also potentially benefit the Arkansas River shiner by increasing detrital input to the aquatic system, increasing the aquatic invertebrate food base, and increasing streamside shading.

Implementation of this alternative would improve riparian habitat for wildlife, including birds, by increasing vegetation species diversity, structural diversity, and density. Habitat improvement would be expected to result in a potential beneficial impact to the peregrine falcon by increasing the availability of the peregrine's prey species, which include ducks, shorebirds, and songbirds. Many of these species utilize riparian habitat for nesting, foraging, or shelter.

Increased reproduction and growth of woody vegetation under this alternative might increase the occurrence of mature trees within some riparian areas. This situation would be expected to be beneficial to bald eagles, which often use large riparian trees, such as cottonwoods, for roosting.

Appendix A presents a discussion of all protected species that occur within the counties of the Taos Field Office containing riparian areas.

4.2.2.3 Cultural and Paleontological Resources

The Adaptive Management Alternative would assign the highest priority to actions geared specifically to the restoration and protection of riparian areas under BLM jurisdiction. As such, this management strategy would serve to reduce or eliminate many activities that not only have an adverse effect on riparian areas, but also a potentially adverse impact on cultural and paleontological resources. Included would be reduction or elimination of grazing and ORV activity in those riparian areas where such activities have been deemed harmful. Building on the premise that many of the adverse impacts on cultural and paleontological resources are due to various types of disturbance, changes in these activities should help to reduce the impacts on archaeological and paleontological sites. The implementation of the Adaptive Management Alternative similarly should help reduce erosion in riparian areas where that process continues to be a problem, thereby reducing another source of potential impact on cultural and paleontological resources.

For cultural and paleontological resources, the ultimate result of this alternative would be similar to that of the Current Management Alternative – that is, both would serve to reduce or eliminate important sources of disturbance to archaeological remains. The main difference would likely be in the speed with which the changes occur, which likely would be faster under the Adaptive Management Alternative.

4.2.2.4 Socioeconomics

As noted above, although an assessment of socioeconomic impacts typically concerns a broad range of effects on the human inhabitants in a particular area, the present evaluation focuses on those impacts associated with the livestock industry. The livestock industry provides substantial revenue both to the State of New Mexico as a whole and to the nine counties where the riparian areas administered by the Taos Field Office are located (see Section 3.6).

The application of the Adaptive Management Alternative (the Preferred Alternative) likely would reduce the amount of BLM-administered land used for grazing, in the interest of improving the condition of riparian areas. Because of the relatively small amount of BLM-administered riparian areas used for grazing and the small tracts usually available on the 12 allotments in the region, this reduction is anticipated to have a small adverse effect on the economies of New Mexico as a whole and northeastern New Mexico in particular — recalling that allotments associated with BLM-administered riparian areas contribute only 0.1% and 1.4% to state and Field Office area grazing, respectively (see Section 4.2.1.4) and that the riparian areas themselves compose an even smaller percentage of the total. However, because riparian areas contribute only a small amount of land to grazing allotments, it is anticipated that allotment use could be reorganized to compensate for the reduced access to these areas. The most important effect likely would be the reduction of what may be locally important access to water — an impact that might be mitigated by providing alternative access to this resource (e.g., through wells).

Because of the small contribution of BLM-administered riparian areas to livestock grazing in the Taos Field Office area, reduced access to these areas is expected to have only a negligible adverse direct impact on the economy of the area — commensurate with the small percentages they contribute to the amount of livestock grazed, as discussed above. Direct economic impacts in this setting involve reductions in income specifically to those in the livestock industry affected by the Adoptive Management Alternative. Secondary economic impacts also would occur, in the form of adjustments in spending patterns of industries and households in response to the direct impacts. Secondary impacts for a particular area may be estimated through the use of input-output modeling techniques, which account for the interrelationship between different sectors of an area's economy (see Miller and Blair 1986), such as the Impact Analysis for Planning model (Minnesota IMPLAN Group 1994). However, given the very small magnitude of the direct economic impacts anticipated, coupled with the potential to reduce the magnitude of these impacts even further through the reorganization of grazing allotments, the BLM decided that such modeling efforts were not warranted.

Reducing grazing access to BLM-administered riparian areas similarly would have a small adverse impact on the sociocultural fabric of the area, through reducing access to public land long recognized as a right by Hispanic inhabitants of the area (Meyer 1998). However, once again the limited amount of land made inaccessible, coupled with continued access to vast amounts of other public lands for grazing, is anticipated to make this impact negligible.

As a final consideration, environmental justice focuses on whether minority or low income populations suffer high and adverse impacts that are disproportionate to those experienced by the population as a whole. Present analyses indicate neither high and adverse nor disproportionate impacts to minority or low income populations.

4.2.3 Grazing Management

Under the Grazing Management Alternative, grazing by domestic livestock in riparian areas would be eliminated by modifying the grazing allotments to exclude these areas (Section 2.1.2). For each allotment affected, this modification would include changing the description of the allotment, installing fences or other physical barriers to exclude livestock from riparian areas, and, if appropriate, adjusting the numbers of livestock permitted to use the modified allotment.

Anticipated impacts of the Grazing Management Alternative are evaluated in the following subsections in terms of attainment of PFC, wildlife and species of special concern, cultural and palenotological resources, and socioeconomics.

4.2.3.1 Attainment of Proper Functioning Condition

Under the Grazing Management Alternative, riparian area development towards PFC would be promoted by excluding any domestic livestock grazing from the riparian-wetland areas under the jurisdiction of the Taos Field Office. This situation contrasts with the Adaptive Management Alternative, which would allow for adaptive management practices, that could include dormant season grazing (such as is currently practiced within the Rio de

Truchas riparian area) or other prescribed grazing strategies within the riparian-wetland areas.

Grazing appears to be a factor contributing to a reduction in vegetation cover and promoting erosion in many of the 20 riparian areas managed by the Taos Field Office. Currently, grazing is potentially contributing, or known to be contributing to a reduction of riparian function at nine of these riparian areas. Three riparian areas have been fenced to exclude grazing, and grazing has been controlled in three other areas by watergaps, permit modification, or other means. The elimination of grazing from all riparian areas would be expected to permit vegetation regrowth and reduce soil compaction, particularly in the Canadian River, Carrizo Creek, and Mora River riparian areas, which are currently rated as NF, primarily because of livestock grazing. Increased vegetative cover and root development throughout the riparian area would promote the diffusion of flood flow energy, reduce soil erosion, and increase the hydrologic function of floodplains. Riparian function would also likely improve in the Chico Creek, Cow Creek, Rio Medio, and Santa Fe River riparian areas, all currently grazed, although the Chico Creek and Santa Fe River riparian areas are also affected by other factors. Effective elimination of grazing from riparian areas would require frequent monitoring. Trespass grazing may continue to occur in areas that are fenced to exclude livestock. Although the Ojo Caliente riparian area was fenced in 1987 to exclude livestock, grazing continues to be evident.

Removal of livestock even from those riparian areas that would be grazed under the Adaptive Management Alternative could hasten the development of those areas toward PFC, provided that other management actions are undertaken. These other actions would include controlling invasive species, planting native species, and carrying out other projects and tasks listed for the Adaptive Management Alternative (see Section 4.2.2.1). However, factors unrelated to grazing, such as continued ORV use within the Chico Creek riparian area and severely reduced water quality within the Santa Fe River riparian area, may prevent or retard attainment of PFC. A number of riparian areas that rated as NF (Cieneguilla) or FAR (Rio de los Pinos, Rio Nutrias, Santa Cruz River Below Dam) are not affected by grazing. Elimination of grazing under this alternative would not be expected to move these areas toward PFC.

4.2.3.2 Wildlife and Protected Species

Under the Grazing Management Alternative, all livestock grazing would be eliminated within the riparian areas under the jurisdiction of the Taos Field Office. Those areas that are currently affected by grazing, particularly where grazing has been identified as the primary factor in failure to attain PFC, would be expected to show an increase in vegetation cover, species diversity, and structural complexity. Habitat value would subsequently increase for many riparian-dependent wildlife species, and wildlife population sizes and diversity would be expected to increase. Wildlife habitat and population levels would not be expected to improve, however, in riparian areas that are affected solely by factors unrelated to grazing, such as upstream water diversion or ORV use.

Under this alternative, all potential southwestern willow flycatcher habitat would be enclosed. This action would be somewhat similar to that under the Adaptive Management Alternative, except that no dormant season grazing would occur within the riparian areas under the Grazing Management Alternative.

With associated riparian management actions (e.g., invasive species control and plantings of native woody species), the riparian areas that have short- or long-term southwestern willow flycatcher habitat potential should continue to improve toward a full potential condition. The opportunity would also exist for several of the riparian areas that do not currently have potential southwestern willow flycatcher habitat to develop such conditions.

The Canadian River, Carizzo Creek, and Mora River riparian areas are adjacent to river or stream segments supporting populations of the Arkansas River shiner. Each of these riparian areas was rated as NF in 1994, largely because of grazing impacts. Improvement of riparian habitat function would likely result under this alternative, and those improvements might include the reduction of soil erosion from riparian areas and increased filtering of stream flows. Reduced erosion and increased filtering would potentially contribute to improvement in water quality within associated streams. This improvement, in turn, would be expected to result in a slight beneficial impact to the Arkansas River shiner, which is threatened by water quality degradation, among other factors. However, because only a small proportion of the riparian habitat along the streams supporting the Arkansas River shiner is under BLM management , the contribution to water quality improvement from changes in BLM management strategy would likely be quite small. Increased riparian species diversity, structural diversity, and productivity resulting from implementation of this alternative would also potentially benefit (to some degree) the Arkansas River shiner by increasing detrital input to the aquatic system, increasing the aquatic invertebrate food base, and increasing streamside shading.

Implementation of the Grazing Management Alternative would also likely improve riparian habitat for wildlife in areas now adversely affected by grazing, such as the Canadian River, Carrizo Creek, and Mora River riparian areas. An increase in vegetation species diversity, structural diversity, and density would improve habitat for many bird species. Habitat improvement within these riparian areas would be expected to result in a potential beneficial impact to the peregrine falcon by increasing the availability of the peregrine's prey species, which include ducks, shorebirds, and songbirds. Many of these species use riparian habitat for nesting, foraging, or shelter.

This alternative would also likely promote increased reproduction and growth of woody vegetation in areas adversely affected by grazing, and might potentially increase the occurrence of mature trees within the Canadian River, Carrizo Creek, and Mora River riparian areas. This result would be expected to be beneficial to bald eagles, which often use large riparian trees, such as cottonwoods, for roosting.

Livestock use of upland areas would increase slightly under this alternative, as riparian areas are closed to grazing. This increase would result in a slightly increased potential for adverse impacts to upland vegetation and wildlife communities, including protected species. However, impacts would be expected to be negligible because of the small proportion of riparian areas within the affected grazing allotments.

Appendix A provides a discussion of all protected species that occur within the counties of the Taos Field Office containing riparian areas.

4.2.3.3 Cultural and Paleontological Resources

Exclusion of domestic livestock grazing from riparian areas in the Taos Field Office riparian/wetland community itself. Ground cover, soil stability, infiltration rates, water holding capacities, shrub and tree regeneration, water quality, and habitat diversity would all increase when livestock grazing pressures are removed. As habitat quality increases, wildlife

Under current management practices, only 4 of the 20 riparian areas (24% of the 17 areas rated from 1994 to 1997; 13% of river miles) under Taos Field Office management (excluding Rio Grande and Rio Chama corridors) have attained PFC. Two of these areas, Rio Quemado region would remove an important source of potential impacts to cultural and paleontological resources in those areas. However, this positive consequence of implementing the Grazing Management Alternative should be considered in the context of a lack of attention to other activities and occurrences in the region that affect cultural and paleontological resources, including ORV use and erosion (although the latter should decline as a consequence of grazing exclusion in riparian areas). It is impossible to compare with any degree of certainty at this point the relative benefits to cultural and paleontological resources of this alternative compared with the other two alternatives being considered.

4.2.3.4 Socioeconomics

As previously noted, although an assessment of socioeconomic impacts typically concerns a broad range of effects on the human inhabitants of a particular area, the present evaluation focuses on those impacts associated with the livestock industry. The livestock industry provides substantial revenue both to the State of New Mexico as a whole and to the nine counties where the riparian areas administered by the Taos Field Office are located (see Section 3.6).

The application of the Grazing Management Alternative would reduce the amount of BLM-administered land used for grazing by excluding riparian areas. However, once again because of the relatively small amount of land contributed by BLM-administered riparian areas to grazing allotments in the region, this reduction likely would have only a small adverse effect on the economies of New Mexico as a whole and northeastern New Mexico in particular — recalling that allotments associated with BLM-administered riparian areas contribute only 0.1% and 1.4% to state and Field Office Area grazing, respectively (see Section 4.2.1.4), and that the riparian areas themselves compose an even smaller percentage of the total. For the same reason, it is anticipated that allotments could be reorganized to compensate for the lack of access to these riparian areas. The most important effect may well be the reduction of locally important access to water – an impact that might be mitigated by providing alternative access to this resource (such as installation of wells).

Because of the small contribution of BLM-administered riparian areas to livestock grazing in the Taos Field Office area, reduced access to these areas is expected to have only a negligible adverse direct impact on the economy of the area — commensurate with the small percentages they contribute to the amount of livestock grazed, as discussed above. Direct economic impacts in this setting involve reductions in income specifically to those in the livestock industry affected by the Grazing Management Alternative. Secondary economic impacts also would occur, in the form of adjustments in spending patterns of industries and households in response to the direct impacts. Secondary economic impacts for a particular area may be estimated through the use of input-output modeling techniques, which account for the interrelationship between different sectors of an area's economy (see Miller and Blair 1986), such as the Impact Analysis for Planning model (Minnesota IMPLAN Group 1994). However, given the very small magnitude of the direct economic impacts anticipated, coupled with the potential to reduce the magnitude of these impacts even further through the reorganization of grazing allotments, the BLM decided that such modeling efforts were not warranted.

Eliminating grazing access to BLM-administered riparian areas would have a similar small adverse impact on the sociocultural fabric

Under the Current Management Alternative, grazing, ORV use, and other recreational activities would continue within many of the riparian areas under the management of the Taos Field Office. Vegetation loss and erosion may continue to be factors affecting the condition of these riparian

One of BLM's management goals for riparian areas is to protect, improve, and enhance riparian habitat for the southwestern willow flycatcher (Silva 1998). In the past, the preservation of a single rare or endangered species initiated habitat restoration activities. More recently, conservation efforts have shifted to the community level because the fulfillment of the area, through reducing access to public land long recognized as a right by Hispanic inhabitants of the area (Meyer 1998). However, once again, the limited amount of land made inaccessible, coupled with continued access to vast amounts of other public lands for grazing, is anticipated to make this impact negligible.

As a final consideration, environmental justice focuses on whether minority or low income populations suffer high and adverse impacts that are disproportionate to those experienced by the population as a whole. Present analyses indicate neither high and adverse nor disproportionate impacts to minority or low income populations.

4.3 ADVERSE EFFECTS THAT CANNOT BE AVOIDED IF THE PROJECT IS IMPLEMENTED

Management of the riparian areas under the jurisdiction of the Taos Field Office would not displace or preclude use of any developed public recreational sites or facilities. Conversely, management of riparian areas would provide allow the opportunity to establish additional recreational or educational sites. Recreational use of the riparian areas by ORVs would be minimized by fencing to establish riparian exclosures. Management of these areas would decrease the amount of land available for livestock grazing within a number of allotments. However, with the development of alternative water sources, loss of the riparian areas would be only a minimal adverse land use impact.

4.4 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Restoration and protection of riparian areas would help stabilize streambanks and stream channels; reduce soil erosion and, consequently, reduce stream sedimentation; improve streamside vegetation cover; improve water quality; increase riparian forage; and increase production of aquatic species. Improvement of streamside vegetation would also increase the abundance and diversity of terrestrial wildlife. Proper management of livestock grazing would increase resource values and, in turn, economic benefits to all users. A short-term loss of forage for domestic livestock may occur when overused and degraded riparian communities are put under proper management, or excluded from livestock use, but increased forage production for livestock and wildlife should ultimately be a result of improved resource management.

Saltcedar control may cause short-term decreases in structural layering and reduce shading until native woody species are reestablished. However, long-term benefits would include the restoration of native plant community succession, a reduction in the rate of evapotranspiration, and a subsequent reduction of salt levels in soil.

4.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

In general, resources that would be committed irreversibly or irretrievably if a particular action was instituted would include materials that could not be recovered or recycled and materials or resources that would be consumed or reduced to irrecoverable forms. Use of concrete, metal, plastics, and other materials to construct fences and livestock watering sources would constitute an irreversible and irretrievable commitment of those resources. However, piping and fence wiring could be recycled to some extent. Resources such as rangeland productive soil and watering sources within riparian exclosures would be unavailable for livestock use (and thus "committed") for all riparian areas removed from allotment bases.

Commitments of water rescurces for upland livestock watering facilities would be insignificant and would not vary notably from direct use of the natural water source. Additionally, recovery by natural processes would occur within a very short time.

4.6 CUMULATIVE IMPACTS

Cumulative impacts are those impacts to the environment that result from the incremental effect of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Under the Adaptive Management Alternative (Preferred Alternative), approximately 2,005 acres of riparian-wetland areas under the management of the BLM's Taos Field Office would be potentially restored toward and/or maintained at PFC. Attainment of this goal would contribute to the continued enhancement of riparian areas within New Mexico, as is being actively pursued by the BLM, the Forest Service, and other government and private organizations within the state. A total of 7,200 acres of riparian-wetland habitat would be restored and protected under riparian management programs of the BLM's Albuquerque, Farmington, Las Cruces, and Taos Field Offices.

In the 11 western states, competing land uses are diminishing the rangeland available for grazing at the rate of 1.4 million acres per year. Thus, pressures for greater livestock production are occurring on less land area (Council for Agricultural Science and Technology 1974). Implementation of livestock management within riparian areas (particularly creation of livestock exclosures) would contribute to the overall decline in the amount of rangeland available for grazing.

Many human disturbances act in a cumulative and synergistic fashion. Natural disturbances often further confound changing land conditions (Van Haveren et al. 1997). The combined influences of geology, climate, soil, vegetation, and water runoff often create unstable conditions even without livestock grazing. Most sites have been modified by land uses for long periods of time, and recognizing what is, and what is not, "natural" variation is difficult (Platts 1991). Riparian areas may have recovered some since 1930 but not nearly to the extent that the overall range has improved. This situation is due to insufficient emphasis having been placed on riparian management, and insufficient availability of expertise to identify habitat deterioration and provide solutions (Platts 1991). Today's land managers not only must administer their own grazing programs properly, but they must also correct the mistakes of the past. Many streams in the West are in their present degraded condition partly because many small annual effects have led a century of accumulated effects (Platts 1991).

While the water quality affected by BLM land uses might improve, it is not expected that any of the water-quality-limited stream reaches identified by the state would improve enough to meet state standards solely from this action. The impacts on those water-quality-limited stream reaches from nonpublic land uses and sources of pollutants would also have to be reduced to help meet state standards (BLM 1999b). The restoration of a species or specific riparian area in isolation from surroundings and processes that affect them often do not result in desirable outcomes. Improvement of many areas would be limited by the fragmented distribution of BLM riparian areas and the lack of coordinated watershed management efforts (BLM 1999b).

The task of modifying existing grazing strategies or developing new ones is complicated by other influences in the watershed (e.g., fertilization, irrigation, wetland drainage, pest control, debris disposal, mechanical treatment of soil, seeding, prescribed burning, water supply development, fencing, and timber thinning) (Platts 1991). Because watersheds occur on both public and private lands, comprehensive rehabilitation projects must involve cooperative efforts of the BLM and U.S. Forest Service on public lands and the Soil Conservation Service on private lands. Innovative grazing systems must be tried to find those practices best suited to avoiding destruction of riparian vegetation (Behnke 1979).

Continued grazing within riparian areas would subject cultural and paleontological resources to physical impacts (e.g., trampling) and accelerated erosion. However, significant impacts from other human activities would be limited, primarily because activities with greater potential for damaging cultural and paleontological resources (e.g., mining) are not extensively developed within the jurisdictional boundary of the Taos Field Office.

5 CONSULTATION AND COORDINATION

5.0 INTRODUCTION

The BLM is preparing this DEIS to assess alternative strategies for managing riparian habitats under the jurisdiction of the Taos Field Office in New Mexico. The BLM has involved and will continue to involve the public in this process and is particularly interested in receiving comments on the analysis of the alternatives being considered in this DEIS for managing these valuable and important resources. The Taos Field Office Riparian and Aquatic HMP will be completed following review and comment on this DEIS by the public, government agencies, and nongovernment organizations. This section describes the consultation and coordination that BLM has conducted in the preparation of the DEIS.

5.1 FORMAL SCOPING

The formal public scoping period began on October 30, 1998, when BLM published a Notice of Intent (NOI) in the *Federal Register* [FR 63(210):58414] to prepare the Taos Riparian and Aquatic Habitat EIS.

During the formal scoping period, BLM held public meetings in Taos on November 17, 1998, and in Santa Fe on November 18, 1998, to discuss the purpose for preparing the EIS and to receive public comments. Thirty-three people attended those meetings and provided their comments and suggestions about the proposal to improve riparian habitat management. In addition, four written comments were received about the proposal following the public meetings. The formal public scoping period ended on December 9, 1998.

A scoping summary report was mailed to everyone on the Riparian Project mailing list on February 1, 1999.

5.2 PUBLICATIONS

In addition to the *Federal Register* notice, BLM sent notices to everyone on the Riparian Project mailing list on October 28, 1998, about the intent to prepare the EIS and provided information about the scoping meetings. A news release was issued on November 10, 1998, regarding the scoping meetings. On March 17, 1999, BLM sent a letter to everyone on the Riparian Project mailing list that provided information on the status of preparation of the DEIS and requested information about their continued interest in receiving information about the project. The updated mailing list that resulted from responses to this inquiry will be used for distribution of future correspondence about the Taos Field Office Riparian and Aquatic Habitat Management Plan/ Environmental Impact Statement. Information about the riparian and aquatic habitat management planning process underway in Taos and other BLM Field Offices in New Mexico is also provided on the New Mexico BLM Web site at www.nm.blm.gov.

5.3 AGENCIES AND ORGANIZATIONS CONSULTED

The following agencies and organizations have been informed or contacted during the preparation of the DEIS:

New Mexico Congressional Delegation
    Senator Domenici
    Senator Bingaman
    Congressman Skeen
    Congressman Udall
    Congressman Wilson

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New Mexico State Government
- Governor's Office
- Lieutenant Governor's Office
- New Mexico Game and Fish Department

County Governments
- Colfax County
- Harding County
- Los Alamos County
- Mora County
- Rio Arriba County
- San Miguel County
- Santa Fe County
- Taos County
- Union County

Tribal Governments
- Pojoaque Pueblo
- Nambe Pueblo
- Tesuque Pueblo
- Jicarilla Apache Tribe
- Santa Clara Pueblo
- Santa Clara Pueblo Environmental Office
- Eight Northern Pueblo Indian Council
- San Juan Pueblo Tribal Administration
- Taos Pueblo
- Taos Pueblo War Chief
- Picuris Pueblo Environmental Department
- San Felipe Pueblo

Federal Agencies
- U.S. Forest Service
- Natural Resources Conservation Service
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency

Nongovernment Organizations
- New Mexico Cattlegrowers Association
- Forest Guardians
- Southwest Center for Biodiversity
- National Audubon Society
- The Nature Conservancy
- Conservation Voters Alliance
- Quivera Coalition
- Native Plant Society
- Sierra Club
- New Mexico Association of Counties
- New Mexico Resource Advisory Council
- New Mexico State University
- University of New Mexico
- New Mexico Farm and Livestock Bureau
- New Mexico Soil Conservation Districts

The following agency has been consulted specifically regarding Section 7 of the Endangered Species Act as it relates to the Taos Riparian and Aquatic Habitat Management EIS:

U.S. Fish and Wildlife Service

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Removal of livestock even from those riparian areas that would be grazed under the Adaptive Management Alternative could hasten the development of those areas toward PFC, provided that other management actions are undertaken. These other actions would include controlling invasive species, planting native

southwestern willow flycatcher habitat would be enclosed. This action would be somewhat similar to that under the Adaptive Management Alternative, except that no dormant season grazing would occur within the riparian areas under the Grazing Management Alternative.

GLOSSARY

Allotment: An area of land designated and managed for grazing of livestock.

Allotment Management Plan (AMP): An activity plan that applies to livestock grazing on public lands, which is prepared in consultation, cooperation, and coordination with the permittee(s), lessee(s), or other involved affected interest(s).

Animal Unit Month (AUM): The amount of forage necessary to sustain one cow and one calf or their equivalent (e.g., five sheep or goats) for one month.

Area of Critical Environmental Concern (ACEC): An area established through the planning process, as provided in the Federal Land Policy and Management Act, where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources or other natural systems or processes; or to protect life and afford safety from natural hazards.

Big Game: Larger species of wildlife that are hunted, such as elk, deer, bighorn sheep, and pronghorn antelope.

Biological Evaluation: A document (usually prepared in conjunction with an environmental impact statement) that analyzes the specific impacts of a nonconstruction project and alternatives on any species that is listed as endangered, threatened, proposed to be listed, or a candidate considered to be listed under the Endangered Species Act and that may occur in the proposal area or be affected by the proposal. The biological evaluation is a requirement of Section 7(a)2 of the Endangered Species Act, which covers consultation between a federal agency and the U.S. Fish and Wildlife Service (FWS). The FWS uses the information in a biological evaluation to render an opinion as to whether the proposed project will jeopardize the continued existence of any listed species. The FWS may suggest or require adjustments to the action to avoid causing adverse impacts to a species or jeopardizing the existence of a species. (A biological assessment is the equivalent document prepared for a project that involves construction.)

Biota or Biotic: Living components of an ecosystem (e.g., plants and animals).

Browse: As noun: That part of the leaf, twig, fruit growth of shrubs, woody vines, and trees that is available for animal consumption. As verb: To consume browse.

Candidate Species: Species identified by the U.S. Fish and Wildlife Service as appropriate for listing as threatened or endangered.

Contiguous: In close proximity, neighboring, adjoining, near in succession, in actual close contact, touching at a point or along a boundary, bounded or traversed by.

Critical Habitat: Portions of the habitat of a wildlife population that, if destroyed or adversely modified, would result in a reduction of the population to a greater extent than would destruction of other portions of the habitat. Such areas may be officially designated by the U.S. Fish and Wildlife Service for listed species.

Cultural Resources: Fragile and nonrenewable remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, work of art, architecture, and natural features important in human events.

Cumulative Impacts: The collective and aggregate impacts of all actions affecting a particular resource.

also potentially benefit (to some degree) the Arkansas River shiner by increasing detrital input to the aquatic system, increasing the aquatic invertebrate food base, and increasing streamside shading.

Implementation of the Grazing Management Alternative would also likely

of the Taos Field Office containing riparian areas.

4.2.3.3 Cultural and Paleontological Resources

Exclusion of domestic livestock grazing from riparian areas in the Taos Field Office

Diversity: The relative degree of abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Ecosystem: A complex, self-sustaining natural system that includes living and nonliving components of the environment and the circulation of matter and energy between organisms and their environment.

Endangered Species: Any species in danger of extinction throughout all or a significant portion of its range.

Endemic: Peculiar to or found only in a particular locality (e.g., endemic plants are common in a locality but not elsewhere).

Environmental Assessment (EA): A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. An EA includes a brief discussion of the need for a proposal, the alternatives considered, the environmental impacts of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental Impact Statement (EIS). A document that is prepared to analyze the impacts of a proposed project or action on the environment and is released to the public for comment and review. An EIS must meet the requirements of the National Environmental Policy Act and the Council on Environmental Quality and the directives of the agency responsible for the proposed project or action.

Federal Land Policy and Management Act of 1976 (FLPMA). Public Law 94-579, signed by the President on October 21, 1976. It establishes public land policy for the management of lands administered by the U.S. Bureau of Land Management (BLM). It specifies several key directions for the BLM, notably (1) management on the basis of multiple use and sustained yield; (2) preparation of land use plans to guide management actions; (3) public land management for the protection, development, and enhancement of resources; (4) public land retention in federal ownership; and (5) incorporation of public participation in reaching management decisions.

Field Office: The smallest administrative subdivision of the U.S. Bureau of Land Management (formerly called Resource Area).

Forage: All browse and herbaceous foods that are available to grazing animals.

Forb: Any herbaceous nonwoody plant that is not a grass or grasslike plant.

Fuelwood: Firewood, wood for fuel.

Habitat: A specific set of physical conditions that surround a single species, group of species, or large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

Habitat Management Plan (HMP): A written and officially approved plan for a specific geographical area of public land that identifies wildlife habitat and related objectives, establishes the sequence of actions for achieving objectives, and outlines procedures for evaluating accomplishments.

Impact: The effect, influence, alteration, or imprint on the natural or human environment caused by an action.

Leasable Minerals: Those minerals or material designated as leasable under the Mineral Leasing Act of 1920. They include coal, phosphate, asphalt, sulphur, potassium and sodium minerals, and oil and gas.

amount of land contributed by BLM-administered riparian areas to grazing allotments in the region, this reduction likely would have only a small adverse effect on the economies of New Mexico as a whole and northeastern New Mexico in particular — recalling that allotments associated with BLM-administered riparian areas contribute only 0.1% and 1.4% to

the magnitude of these impacts even further through the reorganization of grazing allotments, the BLM decided that such modeling efforts were not warranted.

Eliminating grazing access to BLM-administered riparian areas would have a similar small adverse impact on the sociocultural fabric

Lentic: Standing water riparian habitats, such as lakes, ponds, or playas.

Lotic: Moving water riparian habitats, such as rivers, creeks, or springs.

Management Situation Analysis (MSA): An unpublished companion document to a habitat management plan or environmental impact statement that provides the background documentation for the development of alternatives. The MSA contains/covers the Resource Area Profile, Existing Management Situation, Existing Resource Situation, and Opportunity Analysis.

Mitigation: Alleviation or lessening of possible adverse effects on a resource by applying appropriate protective measures or scientific study.

Monitoring: Orderly process of collecting, analyzing, and interpreting resource data to evaluate progress toward meeting management objectives.

Multiple Use: A combination of balanced and diverse resource uses that considers long-term needs or renewable and nonrenewable resources, including recreation, rangeland, timber, minerals, watersheds, and wildlife, along with scenic, scientific, and cultural values.

National Environmental Policy Act of 1969 (NEPA). Public Law 91-190. It establishes environmental policy for the nation. Among other items, NEPA requires federal agencies to consider environmental values in decision-making processes.

National Register of Historic Places (National Register, NRPH). A list of architectural, historical, archaeological, and cultural sites of local, state, or national significance. The list of sites was established by the Historic Preservation Act of 1966 and is maintained by the National Park Service.

Off-Road Vehicle (ORV). Any motorized vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain. It is sometimes referred to as an off-highway vehicle (OHV).

Paleontological Resource. A site containing nonhuman life of past geological periods, usually in the form of fossil remains.

Physiographic Province: An extensive region of similar geological structures and climates that share a common geomorphic history. It normally encompasses many hundreds of square miles and portrays similar qualities of soil, rock, slope, and vegetation.

Proper Use: The proper level of forage utilization that allows for the maintenance or improvement of ecological conditions.

Public Land: Any land or interest in land (outside of Alaska) whose surface and/or subsurface is owned by the United States and administered by the Secretary of the Interior through the Bureau of Land Management.

Rangeland: Land used for grazing by livestock and big game animals on which the vegetation is dominated by grasses, grasslike plants, forbs, or shrubs.

Rangeland Improvement: Any activity or program on or relating to rangelands that is designed to improve production of forage, change vegetation composition, control patterns of use, provide water, stabilize soil and water conditions, or provide habitat for livestock or wildlife.

Raptor: Bird of prey with sharp talons and strongly curved beak (e.g., hawk, owl, vulture, eagle).

However, with the development of alternative water sources, loss of the riparian areas would be only a minimal adverse land use impact.

Research Natural Area: An area that is established and maintained for the primary purpose of research and education because the land has one or more of the following characteristics: (1) a typical representation of a common plant or animal association; (2) an unusual plant or animal association; (3) a threatened or endangered plant or animal species; (4) a typical representation of common geologic, soil, or water features; or (5) outstanding or unusual geologic, soil, or water features.

Resource Management Plan (RMP): A land use plan that establishes land use allocations, multiple-use guidelines, and management objectives for a given planning area. The RMP planning system has been used by the U.S. Bureau of Land Management since 1980.

Riparian Area: A unique form of wetland that represents the transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with rivers and streams, glacial potholes, and shores of lakes and reservoirs with stable water levels are typical riparian areas.

Saleable minerals: Common-variety mineral materials (sand, gravel, etc.) that are disposed of for sale by the federal government under the Material Sales Act of 1947.

Scoping Process: An early and open public participation process for determining the scope of issues to be addressed in an environmental and/or planning document and for identifying the significant issues related to a proposed action.

State-Listed Species: Biota listed by the State of New Mexico as threatened or endangered (animals) or as sensitive or endangered (plants).

Stream: General term for a body of water flowing in a natural channel, as distinct from a constructed channel such as a canal or irrigation ditch. Streams in natural channels and point sources, such as springs and seeps, are classified as either being perennial, intermittent, or ephemeral. These water regimes are defined as follows:

- *Perennial* — A stream or water point source in which there is an uninterrupted surface or subsurface flow of water. Perennial waters are directly associated with a water table in the localities through which they flow. These areas generally maintain a vigorous presence, or high potential for riparian vegetation.

- *Intermittent (= Semiperennial/ Semiephemeral)* — A stream or water point source in which the flow of surface or subsurface water is regularly interrupted for a period of days to months. Semiperennial sources have shorter periods of interruption, days to weeks, and semiephemeral sources have no-flow periods of weeks to months. These areas maintain a variable amount of riparian vegetation. The vegetation may become restricted to very limited and discontinuous areas. These areas are generally more sensitive to disturbance and excessive use.

- *Ephemeral* — A stream or water point source that flows only in direct response to precipitation. The channel or point of exit is permanently above the local water table. These areas generally cannot, nor do they have the potential to, maintain riparian vegetation.

Threatened Species: Any species or significant population of that species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. This category usually includes only those species that have been recognized and listed as threatened by federal and state governments but may include species categorized as rare, very rare, or depleted.

Vandalism: Willful or malicious destruction or defacement of public property (e.g., cultural or paleontological resources).

Vegetation Manipulation: Planned alteration of vegetation communities through use of prescribed fire, plowing, herbicide spraying, or other means to gain desired changes in forage availability or wildlife cover.

Vegetation Treatments: Methods used to control the growth and spread of undesirable vegetation. Control can be by chemical or mechanical means or by fire.

Watershed: The total area above a given point on a waterway that contributes runoff water to the stream flow at that point.

Wetland: Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support and that, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wilderness Study Area (WSA): An area determined to have wilderness characteristics. Wilderness study areas are subject to interdisciplinary analysis through the U.S. Bureau of Land Management's land use planning system and public comment to determine their wilderness suitability. Suitable areas are recommended to the President and Congress for designation as wilderness.

Wildlife: All species of mammals, birds, invertebrates, amphibians, reptiles, or their progeny or eggs that, whether raised in captivity or not, are normally found in a wild state. Feral horses and burrows are excluded.

APPENDIX A:

BIOLOGICAL EVALUATION FOR RIPARIAN AND AQUATIC HABITAT MANAGEMENT

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BIOLOGICAL EVALUATION FOR RIPARIAN AND AQUATIC HABITAT MANAGEMENT

A.1 INTRODUCTION

This biological evaluation has been prepared to analyze the potential impacts on listed species from the preferred alternative as identified in the main text of this Environmental Impact Statement (EIS) for Riparian and Aquatic Habitat Management in the Taos Field Office – New Mexico. The EIS addresses the U.S. Bureau of Land Management's (BLM's) Adaptive Management Alternative proposed for 20 riparian areas within Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Seventeen federally listed, proposed, and candidate species are known to occur, or have the potential to occur, within the seven counties of the Taos Field Office area [U.S. Fish and Wildlife Service (USFWS) 1999]. Additionally, a number of other state-listed and/or BLM-sensitive species are reported from these seven counties. However, the habitats required or preferred by these species may not occur within the specified riparian and aquatic habitats or associated upland allotment areas addressed in the EIS. The potential for these species' presence, their habitats within the area, and any potential impacts on them resulting from implementation of the proposed action are examined in this biological evaluation.

A.1.1 Description of the Project and Preferred Alternative

The EIS assesses potential impacts of three alternative management strategies developed by the BLM for restoring and protecting riparian and aquatic habitats under the jurisdiction of the Taos Field Office. For over a decade, the BLM has emphasized the restoration and protection of streamside riparian areas for the benefit of threatened and endangered species as well as for other riparian-dependent species. Each alternative is capable of accomplishing the proposed action of restoring and protecting riparian and aquatic habitats. The alternatives presented in the EIS are as follows:

- ***Alternative 1: Current Management (No Action Alternative)*** – Continue to manage riparian areas in accordance with applicable BLM guidance with the objective of restoring and protecting such areas in context with authorizing other land management activities. Current management has already restored some riparian areas either by removing domestic livestock from selected riparian areas completely or by implementing other management practices during the growing season.

- ***Alternative 2: Adaptive Management (Preferred Alternative)*** – Assign highest priority to implementing those management practices identified in current BLM management guidance to restore and protect all riparian habitats under BLM jurisdiction. This alternative would require a specific focus on riparian management; decisions regarding other land management activities would be constrained to limit or prevent any adverse impacts on riparian areas.

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- ***Alternative 3: Grazing Management*** – Eliminate grazing by domestic livestock in riparian areas by modifying grazing allotments to exclude such areas. For each allotment affected, this action would include changing the description of the allotment, installing fences or other physical barriers to prevent livestock from entering riparian areas, and, if appropriate, adjusting the number of livestock permitted to use the modified allotment.

Information presented in the EIS underscores the fact that riparian habitats are critical components of the ecosystem, but they are very small areas in relation to the large amount of land administered by the BLM. In addition, segments of riparian areas under BLM jurisdiction are often only small parts of larger areas under jurisdictions over which BLM has no management responsibility or authority. This observation is central to gaining an appreciation for the important, but limited, role that the BLM plays in improving and protecting riparian habitats in New Mexico.

A.1.2 Species Identification

The following evaluations prepared by the Taos Field Office are presented in two major parts. Section A.2 evaluates federally listed threatened, endangered, proposed, and candidate species, as identified by the USFWS (1999) (Table A.1). The BLM has determined, on the basis of this biological evaluation, that the implementation of Adaptive Management for riparian and aquatic habitats would result in the following determinations for these species: *"No Affect"* or *"May Affect – Not Likely to Adversely Affect"* (Table A.2).

Section A.3 evaluates the impacts associated with the implementation of Adaptive Management for riparian and aquatic habitats on state-listed and BLM-sensitive species. Impacts to these species are also determined to be *"No Affect"* or *"May Affect - Not Likely to Adversely Affect"* (Table A.2).

Unless referenced otherwise, much of the following information presented on the life history, distribution, and habitat of the evaluated species comes from *Inventory of Rare and Endangered Plants of New Mexico* (Sivinski and Lightfoot 1995) and from *BISON-M (Biota Information System of New Mexico)* (New Mexico Department of Game and Fish [NMDG&F] 1997).

A.1.3 Cumulative Impacts

In this context, cumulative effects are those effects on endangered, threatened, or other species of special concern or critical habitats from the proposed action plus effects from future nonfederal (state, local government, or private) activities that are reasonably certain to occur in the foreseeable future. These activities include recreation, private subdivision construction, livestock grazing, farming, resource extraction, silviculture, and road construction. An analysis of cumulative impacts for each species is given below.

A.2 FEDERALLY LISTED SPECIES

A.2.1 Black-Footed Ferret (*Mustela nigripes*)

Distribution and Ecology: The black-footed ferret is generally associated with prairie dog towns in grassland plains, semiarid grasslands, and adjacent mountain basins. It is believed that the black-footed ferret is extirpated from New Mexico, not having been seen in the

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TABLE A.1 Status of Listed Species Occurring or with the Potential to Occur in the Taos Field Office

Common Name	Scientific Name	Status[a]	Counties[b]	Habitat
Mammals				
Big free-tailed bat	*Nyctinomops macrotis (= Tadarida m., T. molossa)*	SC	LR	Habitat for the big free-tailed bat is coniferous and mixed woodland and may include rabbitbrush riparian habitats.
Black-footed ferret	*Mustela nigripes*	E	CLMRSFT	The last confirmed report of a black-footed ferret in New Mexico was in 1934. It is closely associated with prairie dog communities in mixed shrub habitat type.
Fringed myotis	*Myotis thysanodes*	SC	CMSFT	The fringed myotis inhabits mid-elevation grasslands and mixed conifer woodlands. It feeds on invertebrates over water.
Goat Peak pika	*Ochotona princeps nigrescens*	SC	LR	Habitat for the Goat Peak pica is alpine and subalpine talus slides and boulder fields.
Long-eared myotis	*Myotis evotis*	SC	CRST	The long-eared myotis is found in ponderosa pine and mixed conifer habitats near surface water.
Long-legged myotis	*Myotis volans*	SC	CLMRSFT	The long-legged myotis occurs in coniferous and deciduous woodlands and sycamore, cottonwood, and rabbitbrush riparian habitats.
New Mexican meadow jumping mouse	*Zapus hudsonius luteus*	SC	CLMRSFT	Habitat for the New Mexican meadow jumping mouse is primarily riparian, with dense herbaceous vegetation in open prairies.
Occult little brown bat	*Myotis lucifugus occultus*	SC	CLMRSFT	The occult little brown bat occurs in ponderosa pine and mixed conifer habitats near permanent water. It feeds on aquatic insects over or near water.
Pale Townsend's (= western) big-eared bat	*Plecotus townsendii pallescens*	SC	MRSFT	Pale Townsend's big-eared bat occurs in desert scrub, sagebrush, chaparral, coniferous, and deciduous forests. It feeds on insects associated with stream corridors.
Pecos River muskrat	*Ondatra zibethicus ripensis*	SC	S	Habitat for the Pecos River muskrat includes riverside marshes and lakes in the Rio Grande and Pecos River basins.
Small-footed myotis	*Myotis ciliolabrum*	SC	RSFT	The small-footed myotis occurs in coniferous and mixed woodland and montane coniferous forest. It is commonly found in willows and other riparian habitats.
Southwestern otter	*Lutra canadensis sonorae*	SC	RT	The southwestern otter has been reported from the upper Rio Grande but may be extirpated from New Mexico. It is associated with permanent water with overhanging vegetation.
Spotted bat	*Euderma maculatum*	SC	LMRSFT	Habitat for the spotted bat is subalpine coniferous forest meadows. It forages over water and is found in riparian habitat.
Swift fox	*Vulpes velox*	C	CMS	Habitat for the swift fox is grassland with a large rodent population, on which this species preys.
Yuma myotis	*Myotis yumanensis*	SC	MRSFT	The Yuma bat forages over water and is found in desert, grassland, woodland, and corresponding riparian communities.

TABLE A.1 (Cont.)

Common Name	Scientific Name	Status[a]	Counties[b]	Habitat
Birds				
American peregrine falcon	*Falco peregrinus anatum*	E	CLMRSFT	Peregrine falcons are typically found on rocky, steep cliffs near rivers or other large water bodies, but they may use snags for nesting and perching in some cases. They prefer elevations from 6,500 to 8,599 feet, but they may be found from 3,500 to 9,000 feet.
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)	CLMRSFT	In New Mexico, the tundra subspecies of *Falco peregrinus, F.p.tundrius*, is a very rare migrant through the state.
Baird's sparrow	*Ammodramus bairdii*	SC	CMRSFT	This bird occurs as a migrant in New Mexico but may be a winter resident in Hidalgo County in the southern part of the state. It occurs in prairies and mountain meadows.
Bald eagle	*Haliaeetus leucocephalus*	T	CLMRSFT	The bald eagle migrates through the Taos Field Office area. Roosting habitat for the bald eagle typically includes large trees along perennial streams or lakes. The Canadian River, Carrizo Creek, and Mora River riparian areas provide winter foraging habitat.
Black tern	*Chlidonias niger*	SC	CRS	The black tern migrates through New Mexico. It occurs in desert riparian deciduous woodlands and prefers cottonwoods.
Brown pelican	*Pelecanus occidentalis*	E	S	Rare visitors to the state, most brown pelicans found in New Mexico occur primarily as immature-aged wanderers during the summer-fall seasons. There are records from 13 New Mexico counties, with most from large lakes or along major rivers, including the San Juan, Gila, Rio Grande, and Pecos drainages.
Ferruginous hawk	*Buteo regalis*	SC	CLMRSFT	The ferruginous hawk nests in prairies and open grassland or grassland/shrub, often near prairie dog towns. Nests are in or on trees, shrubs, ledges, riverbanks, or hillsides.
Interior least tern	*Sterna antillarum*	E	R	This colonial nesting waterbird breeds in southeast New Mexico and is a rare vagrant in the Taos Field Office area. It feeds on or adjacent to water.
Harlequin duck	*Histrionicus histrionicus*	SC	RT	The harlequin duck occurs as an accidental in New Mexico and has been seen on lakes and reservoirs. It may also occur along streams.
Loggerhead shrike	*Lanius ludovicianus*	SC	CLMRSFT	Nesting habitat for the loggerhead shrike includes sagebrush, desert scrub, and pinyon-juniper woodlands. It frequently occurs in open country with shrubs and desert saltgrass, interspersed with pastures, grasslands, and hay fields.
Mexican spotted owl	*Strix occidentalis lucida*	T	CLMRSFT	Primary spotted owl habitat consists of mixed conifer dominated by Douglas-fir, pine, or true fir and pine-oak forests. Secondarily selected habitats include such features as steep, narrow canyons with cliffs and a perennial water source. Such canyon habitats generally include conifer or riparian forests or clumps of trees but also may be sparsely vegetated.

TABLE A.1 (Cont.)

Common Name	Scientific Name	Status[a]	Counties[b]	Habitat
Mountain plover	*Charadrius montanus*	PT	CMSFT	The mountain plover is a grassland species that breeds in New Mexico and winters from central California and northern Mexico east to south Texas. In New Mexico, it breeds locally in dry, open, shortgrass prairie habitats and migrates through the state. A free water source is not necessary.
Northern goshawk	*Accipiter gentilis*	SC	CLMRSFT	The northern goshawk nests in mature coniferous forest at elevations up to 5,500 feet on mountains and high mesas within 0.25 mile of water. It also occurs in deciduous woodlands. It prefers large trees, dense canopies, and north-facing slopes.
Piping plover	*Charadrius melodus*	T	C	In New Mexico, the piping plover is a rare spring migrant. Foraging habitat during migration includes sand beaches and mudflats.
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	CLMRSFT	The southwestern willow flycatcher nests in riparian habitats along rivers, streams, or other wetlands, where dense growths of willows or other woody plants are present, often with a scattered overstory of cottonwood.
Western burrowing owl	*Athene cunicularia hypugea*	SC	CMS	The western burrowing owl nests in abandoned mammal burrows in grasslands, prairies, and open areas.
White-faced ibis	*Plegadis chihi*	SC	CLMRSFT	The white-faced ibis occurs as a migrant along shorelines and marshes adjacent to open water, up to 5,500 feet in elevation. It is generally associated with cattails, rushes, and occasionally shrubs and trees.
Whooping crane	*Grus americana*	XN	LRSFT	Whooping cranes occur as rare migrants in the Taos Field Office area. Roosting habitat includes shallow water of rivers, lakes, and other wetlands and riverine sand bars. Feeding habitat includes wetlands and agricultural fields.
Yellow-billed cuckoo	*Coccyzus americanus*	SC	CLMRSFT	Habitat for the yellow-billed cuckoo includes lowland deciduous woodland, willow and alder thickets, and second-growth woods. Nesting sites include riparian woodlands.
Reptiles				
Texas horned lizard	*Phrynosoma cornutum*	SC	CMSF	The Texas horned lizard is terrestrial, preferring flat, open, dry areas with little vegetation.
Amphibians				
Boreal western toad	*Bufo boreas boreas*	C	R	In New Mexico, boreal western toads have been found only in high-elevation (above 8,500 feet) mountain ponds and lakes.
Jemez Mountains salamander	*Plethodon neomexicanus*	SC	LR	The Jemez Mountains salamander inhabits mixed conifer and spruce-fir forest above 7,200 feet and talus slopes.

TABLE A.1 (Cont.)

Common Name	Scientific Name	Status[a]	Counties[b]	Habitat
Fish				
Arkansas River shiner	*Notropis girardi*	T	CMS	The Arkansas River shiner inhabits the main channels of wide, shallow, sandy-bottomed rivers and large streams.
Colorado pikeminnow	*Ptychocheilus lucius*	E	R	The main stem of the San Juan River is the only habitat for the Colorado pikeminnow in New Mexico.
Flathead chub	*Platygobio (= Hybopsis) gracilis*	SC	CLMRSFT	The flathead chub occurs in turbid water within the main channels of large streams. It is found in the Rio Grande, Pecos, and Canadian drainages.
Plains minnow	*Hybognathus placitus*	SC	CS	The plains minnow occurs in the Canadian and Dry Cimarron drainages, along the main channels and portions of tributaries. It prefers sandy river bottoms.
Roundtail chub	*Gila robusta*	SC	R	The roundtail chub occurs in pools of large rivers and in reservoirs. In Rio Arriba County, it is found in the San Juan River.
Invertebrates				
Cockerell's striate disc (snail)	*Discus shemeki cockerelli*	SC	T	Habitat for the Cockerell's striate disc is spruce-fir forest, between 7,000 and 12,000 feet in elevation.
New Mexico silverspot butterfly	*Speyeria nokomis nitocris*	SC	LMST	Habitat for the New Mexico silverspot butterfly includes moist meadows, seeps, marshes, and streamsides.
Sangre de Cristo peaclam	*Pisidium sanguinichristi*	SC	T	The only known population of the Sangre de Cristo peaclam is a single high-elevation lake in the Sangre de Cristo Mountains.
Plants				
Arizona willow	*Salix arizonica*	SC	RT	Arizona willow occurs in wet meadows, along streamsides, and in cienegas above 8,000 feet in elevation. Arizona willow prefers full sun or partial shade.
Chiricahua dock	*Rumex orthoneurus*	PT	SFT	Chiricahua dock is a riparian species of perennial springs and streams in shaded canyons.
Dwarf milkweed	*Asclepias uncialis* var. *uncialis*	SC	CS	Dwarf milkweed occurs in short-grass prairie and coniferous woodland.
Holy Ghost ipomopsis	*Ipomopsis sancti-spiritus*	E	S	This ipomopsis occurs on canyon slopes only in Holy Ghost Canyon in Santa Fe National Forest
Ripley's milkvetch	*Astragalus ripleyi*	SC	RT	Ripley's milkvetch occurs in open ponderosa pine savannas and the edges of ponderosa pine, mixed conifer, or pinyon-juniper woodlands.
Santa Fe cholla	*Opuntia viridiflora*	SC	F	The Santa Fe cholla occurs on south- and west-facing slopes in pinyon-juniper woodland near 7,200 feet in elevation.

[a] C = candidate for federal listing, E = federally listed as endangered, PT = proposed for federal listing as threatened, S/A = similarity of appearance, SC = species of concern (includes state-listed species and species listed by BLM as sensitive), T = federally listed as threatened.

[b] County codes: C = Colfax, F = Santa Fe, L = Los Alamos, M = Mora, R = Rio Arriba, S = San Miguel, T = Taos. (Refers only to New Mexico counties within the Taos Field Office area.)

TABLE A.2 Evaluation of Potential Effects of Riparian Management Alternatives on Listed Species[a]

Species	Current Management Alternative 1	Adaptive Management Alternative 2	Grazing Management Alternative 3
Mammals			
Big free-tailed bat	MA-NLTAA	MA-NLTAA	MA-NLTAA
Black-footed ferret	NE	NE	NE
Fringed myotis	MA-NLTAA	MA-NLTAA	MA-NLTAA
Goat Peak pika	NE	NE	NE
Long-eared myotis	MA-NLTAA	MA-NLTAA	MA-NLTAA
Long-legged myotis	MA-NLTAA	MA-NLTAA	MA-NLTAA
New Mexican meadow jumping mouse	MA-NLTAA	MA-NLTAA	MA-NLTAA
Occult little brown bat	MA-NLTAA	MA-NLTAA	MA-NLTAA
Pale Townsend's (= western) big-eared bat	MA-NLTAA	MA-NLTAA	MA-NLTAA
Pecos River muskrat	MA-NLTAA	MA-NLTAA	MA-NLTAA
Small-footed myotis	MA-NLTAA	MA-NLTAA	MA-NLTAA
Southwestern otter	MA-NLTAA	MA-NLTAA	MA-NLTAA
Spotted bat	MA-NLTAA	MA-NLTAA	MA-NLTAA
Swift fox	MA-NLTAA.	MA-NLTAA	MA-NLTAA
Yuma myotis	MA-NLTAA	MA-NLTAA	MA-NLTAA
Birds			
American peregrine falcon	MA-NLTAA	MA-NLTAA	MA-NLTAA
Arctic peregrine falcon	MA-NLTAA	MA-NLTAA	MA-NLTAA
Baird's sparrow	NE - HNP	NE - HNP	NE - HNP
Bald eagle	MA-NLTAA	MA-NLTAA	MA-NLTAA
Black tern	MA-NLTAA	MA-NLTAA	MA-NLTAA
Brown pelican	NE	NE	NE
Ferruginous hawk	MA-NLTAA	MA-NLTAA	MA-NLTAA
Interior least tern	MA-NLTAA	MA-NLTAA	MA-NLTAA
Harlequin duck	MA-NLTAA	MA-NLTAA	MA-NLTAA

TABLE A.2 (Cont.)

Species	Current Management Alternative 1	Adaptive Management Alternative 2	Grazing Management Alternative 3
Loggerhead shrike	NE	NE	NE
Mexican spotted owl	MA-NLTAA	MA-NLTAA	MA-NLTAA
Mountain plover	MA-NLTAA	MA-NLTAA	MA-NLTAA
Northern goshawk	NE	NE	NE
Piping plover	MA-NLTAA	MA-NLTAA	MA-NLTAA
Southwestern willow flycatcher	MA-NLTAA	MA-NLTAA	MA-NLTAA
Western burrowing owl	NE	NE	NE
White-faced ibis	MA-NLTAA	MA-NLTAA	MA-NLTAA
Whooping crane	MA-NLTAA	MA-NLTAA	MA-NLTAA
Yellow-billed cuckoo	MA-NLTAA	MA-NLTAA	MA-NLTAA
Reptiles			
Texas horned lizard	NE	NE	NE
Amphibians			
Boreal western toad	NE-HNP	NE-HNP	NE-HNP
Jemez Mountains salamander	NE-HNP	NE-HNP	NE-HNP
Fish			
Arkansas River shiner	MA-NLTAA	MA-NLTAA	MA-NLTAA
Colorado pikeminnow	NE	NE	NE
Flathead chub	MA-NLTAA	MA-NLTAA	MA-NLTAA
Plains minnow	MA-NLTAA	MA-NLTAA	MA-NLTAA
Roundtail chub	NE	NE	NE

TABLE A.2 (Cont.)

Species	Current Management Alternative 1	Adaptive Management Alternative 2	Grazing Management Alternative 3
Invertebrates			
Cockerell's striate disc (snail)	NE	NE	NE
New Mexico silverspot butterfly	MA-NLTAA	MA-NLTAA	MA-NLTAA
Sangre de Cristo peaclam	NE	NE	NE
Plants			
Arizona willow	MA-NLTAA	MA-NLTAA	MA-NLTAA
Chiricahua dock	MA-NLTAA	MA-NLTAA	MA-NLTAA
Dwarf milkweed	NE	NE	NE
Holy Ghost ipomopsis	NE	NE	NE
Ripley milkvetch	NE	NE	NE
Santa Fe cholla	NE	NE	NE

[a] NE = no effect, MA-NLTAA = may affect – not likely to adversely affect, NE-HNP = no effect – habitat not present.

wild since 1934. However, a captive breeding project was initiated in 1998 at the Vermejo Park Ranch near Raton, Colfax County (BLM 1999).

The black-footed ferret was severely affected by a decline in prairie dog colonies resulting from prairie dog poisoning programs. Also, land use practices that converted plains to agricultural and urban areas have affected the species (BLM 1999).

No prairie dog colonies of the size necessary to support black-footed ferrets (over 80 acres) occur on any of the allotments associated with the riparian areas. Livestock grazing is benign or beneficial to prairie dog colony development. The prairie dog population within Taos Field Office lands appears to be stable, although it fluctuates on a regular basis, primarily because of plague (BLM 1999).

Effects Determination: *No Effect*. On the basis of the analysis that suitable habitat (e.g., large prairie dog colonies) does not exist on allotment uplands and that riparian areas do not provide black-footed ferret habitat (coupled with the fact that the black-footed ferret is extirpated from New Mexico), the BLM has determined that implementation of Adaptive Management would result in *"No Effect"* for the black-footed ferret. No current or potential habitat exists within any of the specified riparian areas nor their associated upland areas within the allotments to support the black-footed ferret. Because the proposed action has *"No Effect"* for the black-footed ferret, there would be no incremental increase in the existing or foreseeable future cumulative impacts within the Taos Field Office for this species. The cumulative impacts presently existing for this species would not change because of this action.

A.2.2 Swift Fox (Vulpes velox)

Distribution and Ecology: Foraging and burrowing habitat for this species is primarily short- or mid-grass climax or subclimax grasslands. Rodents are the prey species and most limiting factor to swift fox populations. Swift fox are most common in areas of soft soils and large rodent populations. Threats to the species include conversion of prairie grassland habitat to cultivation or development, inadvertent poisoning, rodent control, indiscriminate hunting, and capture by dogs. Sharp population declines occurred with prairie settlement beginning in the late 1800s. The species' range includes New Mexico from the Pecos River east to Texas and Oklahoma (BLM 1999). Within the Taos Field Office area, the swift fox occurs in Colfax, Mora, and San Miguel Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect*. Swift fox may occur in upland areas near riparian areas managed by the Taos Field Office. However, riparian habitat management would not be expected to adversely affect populations of rodents, which are the prey species of the swift fox. The proposed action also would not result in the conversion of grassland habitat to agriculture or development. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change because of this action.

A.2.3 American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*Falco peregrinus tundrius*) – "Migration Only"

Distribution and Ecology: In New Mexico, the American peregrine falcon breeds locally in mountainous areas and occurs in all New Mexico mountain ranges. Both subspecies occur during migration essentially statewide, but mainly west of the eastern plains. However, known records for the Arctic peregrine falcon are only for Chaves and McKinley Counties. The preferred habitat for the peregrine falcon is generally large cliffs (100 to 200 feet high) near water and with relatively dense avian prey species (e.g., waterfowl, passerine birds, shorebirds). Habitat requirements typically include an inaccessible (to humans and predators) nest site, an adequate prey base, proximity to water, and isolation from human disturbances. Peregrine falcons are found in Douglas fir, hemlock-sitka spruce, redwood, ponderosa pine, larch/white pine, lodgepole pine, fir-spruce, aspen (hardwoods), chaparral, and pinyon-juniper forest types. Foraging habitats are varied, including riparian woodlands, coniferous and deciduous forests, shrublands, and prairies. The bird occurs in all seven counties included in the Taos Field Office area. Three riparian areas (Canadian River, Carrizo Creek, and Mora River riparian areas) provide winter foraging habitat for the American peregrine falcon. These three riparian areas consist of about 89 acres and extend a total of 3 linear miles. Migratory falcons may fly over many of the other riparian areas and may temporarily use these areas for foraging.

The main threat to peregrine falcons has been attributed to pesticide use, particularly DDT. Continuing threats include pesticide poisoning in wintering grounds, low breeding densities and reproductive isolation, lack of gene flow between populations, reduced availability of foraging habitat and avian prey, and disturbance of nesting pairs.

The Arctic peregrine falcon has recovered from its previous endangered status, but because its appearance is similar to that of the American subspecies, it will remain listed until both subspecies can be removed from the Endangered Species List.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would improve riparian habitat for wildlife, including birds, by increasing vegetation species diversity, structural diversity, and density. Habitat improvement would be expected to result in a potential beneficial impact to the peregrine falcon by increasing the availability of prey species, which include ducks, shorebirds, and songbirds. Many of these prey species utilize riparian habitat for nesting, foraging, or shelter. The cumulative impact associated with the *"May Affect – Not Likely to Adversely Affect"* determination would be an increase in the quality of habitat to support the avian prey base for the peregrine falcon.

A.2.4 Bald Eagle (*Haliaeetus leucocephalus*)

Distribution and Ecology: Bald eagles are usually associated with medium to large perennial streams, rivers, and other water bodies that provide an adequate prey base and appropriate nesting/roosting habitat. Outside of the major river corridors (e.g., Rio Grande), the bald eagle has been observed to be a migrant only because of the lack of such habitat (BLM 1999). Winter and migrant populations seem to have increased in New Mexico. Mid-winter numbers averaged about 430 birds per year between 1990 and 1994. Only two pairs were known to nest in the state. Key habitat areas include winter roost and concentration areas. Optimal habitats center on riparian and lacustrine environments where food, shelter, and potential nest sites are in the greatest supply.

Bald eagles require large trees or cliffs near water where a good supply of fish, waterfowl, or carrion is available. Jackrabbits and other mammals are also taken, especially by "dry land" eagles. These eagles most notably occur between the Pecos Valley and the Sandia, Manzano, Capitan, and Sacramento Mountains and on the Mogollon Plateau.

Bald eagle declines were caused by pesticide-induced reproductive failure, loss of riparian habitat, and human disturbance (e.g., shooting, poisoning, and trapping).

The bald eagle occurs in all seven of the counties in the Taos Field Office area. Three riparian areas (Canadian River, Carrizo Creek, and Mora River riparian areas) provide winter foraging habitat for the bald eagle.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Increased reproduction and growth of woody vegetation as a result of implementation of the proposed action may potentially increase the occurrence of mature trees within some riparian areas. This condition would be expected to be beneficial for bald eagles, which often use large riparian trees, such as cottonwoods, for roosting. Improved function of riparian habitat would also be beneficial to fish species within the associated streams, thereby increasing the amount of prey available for the bald eagle. The cumulative impact associated with the *"May Affect – Not Likely to Adversely Affect"* determination would be an increase in roosting habitat and prey availability for the bald eagle.

A.2.5 Brown Pelican (*Pelicanus occidentalis*)

Distribution and Ecology: The brown pelican breeds on sea coasts, occurring mainly as a vagrant within the inland United States. The brown pelican population was greatly reduced over much of its U.S. range, largely because of pesticide contamination of the fish species it takes as prey. Although the species has experienced a comeback in many coastal areas, populations west of Mississippi have remained endangered. The brown pelican is rare throughout New Mexico, and occurrences are typically composed of immature birds. In the Taos Field Office area, the brown pelican has been known to occur only in San Miguel County, where it is an occasional transient.

Effects Determination: *No Effect.* Nesting habitat for the brown pelican does not exist within the Taos Field Office area; thus, the implementation of the proposed action would not affect the species. Because the proposed action has *"No Effect"* for the brown pelican, there would be no incremental increase in the existing or foreseeable future cumulative impacts within the Taos Field Office for this species. The cumulative impacts presently existing for this species would not change because of this action.

A.2.6 Interior Least Tern (Sterna antillarum)

Distribution and Ecology: The interior least tern historically occurred along the major river systems of the midwestern United States, including the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi River systems. It now occurs in small remnant colonies. In New Mexico, it is found mainly in the southeastern part of the state, in and around Bitter Lake National Wildlife Refuge. It is an occasional migrant to other counties in the state and would be considered a rare vagrant within the Taos Field Office area. In the seven-county area, it has been known to occur only in Rio Arriba County.

The interior least tern is a colonial nesting shorebird. It is associated with water, although it spends much of its time on sand bars and playas, snatching its food from the surface of the water. It feeds primarily on fish, although it also

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consumes crustaceans and insects. Riverine nesting areas are sparsely vegetated sand and gravel bars within a wide, unobstructed river channel or salt (alkali) flats along the shorelines. Although potential nesting habitat may occur along the Rio Grande, riparian areas along the Rio Grande are outside the scope of this EIS. Foraging habitat may potentially exist within or adjacent to riparian areas considered in this EIS.

Channelization, irrigation, and the construction of reservoirs and pools have contributed to the elimination of much of the interior least tern's nesting habitat. Additionally, recreational use of sand bars along rivers and lakes, environmental contamination, and predation have adversely affected the interior least tern. Its habitat is susceptible to unpredictable water discharge patterns below dams that could flood nesting areas and to overgrowth of brush and trees along shorelines. Adverse management practices include creation of reservoirs, channelization, allowing altered vegetation succession, and allowing recreation on sandbars.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* The interior least tern is only a rare vagrant within the Taos Field Office area. No current or potential breeding habitat exists within any of the riparian areas under the management of the Taos Field Office, and within the scope of this EIS, to support the interior least tern. Foraging habitat may potentially exist within or adjacent to riparian areas. The cumulative impacts presently existing (e.g., federal, private, and state activities) for this species would not change because of Adaptive Management.

A.2.7 Mexican Spotted Owl (*Strix occidentalis lucida*)

Distribution and Ecology: The Mexican spotted owl occupies mountainous areas, with its preferred habitat consisting of dense, multistoried forests with moderately closed to closed canopies (e.g., mature and old growth forests). The owls have also been observed in canyon systems with little or no tree cover. These areas appear to provide a microclimate that is the same or similar to that of dense multistoried forests (BLM 1999). Mexican spotted owls use a variety of montane forest types, ranging from deciduous riparian woodlands, through pinyon-juniper, pine-oak, mixed conifer, and spruce-fir. Their breeding habitat is limited to forest communities, often late-seral-stage conifer forests of high commercial value. Home range for a single owl averages more than 1,600 acres, while the home range for a nesting pair averages more than 2,090 acres. Most nest trees are selected on moderate to steep slopes at elevations ranging from 6,000 to 8,000 feet. Most of the owl's activities during the breeding season occur within the nest site canyons. The owl feeds primarily on mammals but also preys upon birds, reptiles, and insects. Foraging sites often include high canopy closure and dense areas of trees and snags. It drinks from small seeps and creeks.

The largest populations of Mexican spotted owls in New Mexico occur in the Gila National Forest in the west-southwestern portion of the state and in the Sacramento Mountains in the south-central portion of the state. Among the known locations of Mexican spotted owls throughout their range in 1990, 91% were on national forests, 4% on Indian reservations, 4% on national parks, and 1% on BLM lands.

The Mexican spotted owl is threatened by timber management practices, even-aged silviculture management practices in forest habitats, increased predation associated with habitat fragmentation, and fires. Secondary losses of habitat are due to urban and suburban expansion, water development in riparian corridors, agricultural development, fuelwood/oak harvest, reservoir development, and mining. Most riparian areas that have been lost or impaired in New Mexico have occurred at low to middle elevations. The importance of these riparian woodlands to the Mexican spotted owl is unknown, although winter use of these habitats has been documented. Also, riparian areas provide dispersal corridors between semi-isolated montane habitat regions.

Within the Taos Field Office area, the Mexican spotted owl has been known to occur in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties. A number of riparian areas managed by the Taos Field Office could contain potential forest/canyon habitat to support Mexican spotted owl.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* On the basis of the analysis that habitat to support the Mexican spotted owl may exist within some riparian areas, the BLM has determined that implementation of adaptive management practices would result in a *"May Affect – Not Likely to Adversely Affect"* situation for the Mexican spotted owl. Increased reproduction and growth of woody vegetation as a result of implementation of the proposed action may increase the occurrence of mature trees within some riparian areas. This situation would be expected to be beneficial to the Mexican spotted owl. Improved function of riparian habitat would also be beneficial to other wildlife, including prey species of the Mexican spotted owl. The cumulative impact associated with the *"May Affect – Not Likely to Adversely Affect"* determination would be an increase in the quality of habitat to support the Mexican spotted owl.

A.2.8 Mountain Plover (*Charadrius montanus*)

Distribution and Ecology: The mountain plover is a lowland grassland species. It prefers flat, short-grass prairie and tends to avoid taller grasses and hillsides. Suitable habitat occurs in areas often grazed by livestock. It prefers habitat consisting of large areas of bare ground and short grass (less than 4-inch-tall stubble). Such requirements are met by rangelands, prairie dog towns, disturbed areas around windmills and water tanks, and barren playas. Nests are often located near woody plants, cow manure, rocks, fence posts, and power poles. It is territorial only during the breeding season. Territory size in Colorado is about 39.5 acres (territory size in New Mexico has not been determined). Turf farms are also inhabited during spring and fall migrations. It does not require a free water source. Mountain plovers are insectivorous, foraging for prey on the ground.

Mountain plovers have been documented to prefer grazed areas over nongrazed areas for breeding. Thus, cattle grazing is not expected to have a detrimental affect on the mountain plover. The leading causes of death for nestlings are predation, poor nutrition, and disease. Mining and conversion of native grasslands to agricultural fields have had the greatest impact on mountain plover populations.

Mountain plovers are likely to occur throughout Taos Field Office lands, particularly in the short-grass prairie regions. Within the Taos Field Office area, mountain plovers occur on a number of grazing allotments in Colfax, Mora, San Miguel, Santa Fe, and Taos Counties. Impacts to mountain plovers have occurred from conversion of grasslands to croplands and urban uses, prairie dog control, mineral development, and domestic livestock management.

Livestock management practices are now encouraging vegetation growth by the development of grazing systems that allow growing season rest and limit overall utilization levels. Such actions are helping to restore PFC in both uplands and riparian areas. However, such actions could decrease mountain plover habitat, especially where grass may exceed the height preferred by the birds. This situation would most likely occur within riparian enclosures, which, in some cases, would also include some upland acreage (BLM 1999). However, such enclosures are intermingled and in close proximity to grazed pastures, which provide the lower stubble height preferred by mountain plovers. Also, livestock watering facilities provide the preferred habitat for mountain plovers. Even if livestock grazing management strategies were implemented to improve vegetative cover, a mosaic of vegetation and bare ground would still occur throughout BLM-administered lands, as well as in adjacent private, state, and Indian reservation lands (BLM 1999).

Effects Determination: *May Affect – Not Likely to Adversely Affect*. The BLM has determined that implementation of adaptive management practices would have the potential to create a *"May Affect – Not Likely to Adversely Affect"* determination for the mountain plover. Short-grass prairies and grazed pastures (preferred habitats) are found throughout the allotments associated with the specified riparian areas and adjacent lands not administered by the BLM. Mountain plovers are mobile and will move from one pasture to another to find preferred habitat conditions. Additionally, livestock watering facilities would need to be established (if not already present) where riparian areas are fenced to exclude livestock. Watering facilities would provide preferred habitat for mountain plovers (BLM 1999). Because many different grazing systems occur within these allotments, grazing would continue to occur throughout the year on both public and private lands. Therefore, adverse impacts to mountain plovers would not be anticipated.

Because of the general lack of water to sustain crop production and the unsuitability of grazing lands for agricultural use, it is not anticipated that conversion of grasslands to croplands would be a major factor in habitat loss for the mountain plover (BLM 1999). The cumulative impacts from the loss of habitat to urbanization, agriculture, and riparian habitat improvements are not expected to adversely affect the mountain plover within the Taos Field Office area (BLM 1999).

A.2.9 Piping Plover (*Charadrius melodus*)

Distribution and Ecology: The piping plover occurs on sandflats or along bare shorelines of rivers, lakes, or coasts. Mudflats and sandbars in New Mexico wetlands may provide foraging habitat during spring migration. The piping plover forages on a variety of invertebrates, including insects, worms, crustaceans, and mollusks. The population of this species has declined drastically since 1940. The reduction in population has resulted from the loss of beach habitat and the modification of habitat through channelization and damming of rivers, which have eliminated sandbars and allowed vegetation to grow on nesting areas. The loss or alteration of nesting and wintering habitats (as a result of activities such as development, vehicular traffic, human disturbance, and the adverse effects of impoundments and/or irregular water releases in riverine areas) are the major threats to the piping plover. Human disturbance on beaches is a significant problem. The 1993 population of the piping plover was estimated to be 5,000. It breeds (or bred) locally from Alberta and Manitoba south to Nebraska, in the Great Lakes region, and along the Atlantic Coast. It winters primarily along the Atlantic and Gulf Coasts from South Carolina to Texas. In New Mexico, the piping plover is known only as a rare spring migrant; migration is generally through the Mississippi River valley (NMDG&F 1997). Within the Taos Field Office area, the piping plover has been known to occur only in Colfax County, although intermittently exposed substrates along Santa Cruz Lake in Santa Fe County may provide foraging habitat.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Foraging habitat (sand beaches and mudflats) for the piping plover during migration generally does not occur along riparian areas within the Taos Field Office area, although substrates may be intermittently exposed along Santa Cruz Lake by fluctuations in the reservoir level. This species is a rare migrant through the Taos Field Office area and is primarily threatened by habitat loss in breeding and wintering areas. Restoration and protection of riparian areas managed by the Taos Field Office would not be expected to adversely affect habitat for the species. The cumulative impacts presently existing (e.g., federal, private, state activities) for this species would not change because of this action.

A.2.10 Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Distribution and Ecology: The southwestern willow flycatcher is found in desert riparian habitats where dense groves of willows, buttonbrush, boxelder, alder, and other trees and shrubs occur. In some locations, exotic plants, including saltcedar and Russian olive, are also used for nesting or migratory stopovers. The bird is associated with multilayered vegetation in close proximity to slack water. The surrounding vegetation in nesting areas generally ranges from 12 to 21 feet high.

The southwestern willow flycatcher occurs statewide during migration. It breeds in the Chama, Rio Grande, Zuni, San Francisco, Gila, and probably the Hondo Basins. Areas of key habitat include breeding areas in the vicinities of Zuni (McKinley County), Corrales (Sandoval County) to upper Elephant Butte Reservoir (Sierra County), Glenwood-Pleasanton (Catron County), and Cliff-Redrock (Grant County).

Riparian habitat loss or degradation and related impacts (e.g., parasitism by brown-headed cowbirds) are the primary causes leading to the endangered status of the southwestern willow flycatcher. Most of the areas still known to support the southwestern willow flycatcher have low levels of livestock grazing (or none). Pesticides may also affect the southwestern willow flycatcher. The bird migrates to tropical areas in the winter, but the habitats it uses in its wintering grounds are unknown. Tropical deforestation may restrict wintering habitats for this and other neotropical migrants.

The protection and restoration of riparian habitats are essential steps in the conservation of breeding southwestern willow flycatchers in New Mexico, with key elements being an overstory of tall trees, an understory of smaller trees or large shrubs, and nearby areas of surface water. This species is an important indicator species for the health of southwestern riparian ecosystems. Conservation of the southwestern willow flycatcher will aid in efforts to conserve riparian habitats in general.

Within the Taos Field Office area, the flycatchers have been observed in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties. Small groups of southwestern willow flycatcher territories have been identified along the Rio Grande and the Rio Chama. However, no occupied southwestern willow flycatcher habitat or unoccupied, currently potential habitat occurs within the riparian areas under the jurisdiction of the Taos Field Office that are within the scope of this EIS. Approximately 26 miles of riparian habitat, including 1,510 acres, in the area addressed by this EIS support potential southwestern willow flycatcher habitat. One riparian area (Rio de Truchas) has potential habitat in the short term (1-3 years). Seven riparian areas (Lobo Canyon, Ojo Caliente Riparian Demonstration Area, upper Ojo Caliente, Rio Cebolla, Rio de los Pinos, Santa Cruz River above Lake, and Santa Fe River) have potential habitat in the long term (4-10 years) (Silva 1998). A Biological Opinion on the Taos Resource Area Resource Management Plan (RMP) (USFWS 1997) determined that the actions implemented under the RMP are likely to jeopardize the continued existence of the southwestern willow flycatcher. As a result of that determination, the Southwestern Willow Flycatcher Management Plan (Taos Resource Area) was developed. Management activities identified in that plan are designed to protect, improve, or reestablish southwestern willow flycatcher habitat within the area managed by the Taos Field Office.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Vegetation communities within riparian areas under the management of the Taos Field Office would develop a diversity of herbaceous and woody native riparian species as a result of implementation of the proposed action. Habitat value would subsequently increase for many riparian-dependent wildlife species. The seven riparian areas that have been identified as short- or long-term potential nesting habitat for the southwestern willow flycatcher would receive special protection, management, and monitoring and would be expected to attain currently potential habitat status. As riparian vegetation communities improve, additional riparian areas may develop potential southwestern willow flycatcher habitat. The cumulative impact associated with the *"May Affect – Not Likely to Adversely Affect"* determination would be an increase in the quality of habitat to support breeding and/or migratory stopovers for the southwestern willow flycatcher.

A.2.11 Whooping Crane (*Grus americana*)

Distribution and Ecology: The whooping crane breeds mainly at Wood Buffalo National Park in Canada and winters mainly along the Gulf Coast of Texas at the Aransas National Wildlife Refuge. A few whooping cranes raised by foster parents (sandhill cranes) at Grays Lake, Idaho, migrate with sandhill cranes to the Rio Grande Valley, New Mexico. These birds (down from a high of 33 to only 4) winter mainly in the Bosque del Apache National Wildlife Refuge, located about 20 miles south of Socorro, New Mexico. This population is designated as a nonessential experimental population, and it is expected that these birds will die by the year 2006. Pairing and reproduction of this experimental flock never occurred.

Whooping cranes select an open expanse of shallow water in rivers, lakes, reservoirs, and native wetlands for nightly roosting. These sites include stockponds, marshes, and flooded grain fields. Feeding sites include these wetland types and agricultural fields (particularly with waste grain or sprouting crops). The whooping cranes feed on small grains, alfalfa, winter wheat, aquatic plants, invertebrates, and small vertebrates. They typically roost on sandbars within the Rio Grande floodplain. They seasonally move up and down the Rio Grande corridor during their spring and fall migrations; however, they would be considered rare visitors to the area (BLM 1999). Whooping cranes adhere to ancestral breeding areas, migratory routes, and wintering grounds, leaving little possibility of pioneering into new regions.

The conversion of wetlands and prairies to croplands contributed to their drastic decline. Collisions with power lines and fences, predators, and disease are known hazards to wild whooping cranes in the Rocky Mountains.

Within the Taos Field Office area, the whooping crane is a rare migrant and has been known to occur in Los Alamos, Rio Arriba, San Miguel, Santa Fe, and Taos Counties. However, no suitable nesting or wintering habitat occurs on BLM-administered lands in the Taos Field Office area within the scope of this EIS. Although portions of the Rio Grande lie within the Taos Field Office area, riparian areas along the Rio Grande are outside the scope of this EIS. The limited number of individuals left in the experimental population makes it unlikely that the whooping crane would occur at any of the specified riparians and associated aquatic habitats, although roosting and foraging habitat may exist.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* The specified riparian areas and associated upland rangelands do not provide nesting or wintering habitat for the whooping crane. However, roosting or foraging habitat for migrating whooping cranes may occur within or adjacent to the specified riparian areas. Implementation of the proposed action would result in an improvement in riparian and aquatic communities and would not adversely affect habitat for whooping cranes. There would be no incremental increase in the existing or foreseeable future cumulative impacts within the Taos Field Office for this species.

A.2.12 Arkansas River Shiner (*Notropis girardi*)

Distribution and Ecology: The Arkansas River shiner historically inhabited the main channels of wide, shallow, sandy-bottomed rivers and larger streams of the Arkansas River basin and presently occurs in New Mexico, Oklahoma, Texas, and Kansas. In New Mexico, the Arkansas River shiner occurs in the Canadian River system. The population is threatened by the destruction and modification of habitat resulting from the dewatering or depletion of streams due to diversion of surface water, groundwater pumping, construction of impoundments, and water quality degradation. A non-native, introduced population occurs in the Pecos River in New Mexico; however, the USFWS did not propose listing this population and did not include it in the Final Rule for this species (USFWS 1998). The decline of this species throughout its historical range may be attributed primarily to inundation and modification of stream discharge as a result of impoundments, channel desiccation (drying out) as a result of water diversion and excessive groundwater pumping, stream channelization, and introduction of non-native species (USFWS 1998). Within the Taos Field Office area, the fish occurs in Colfax, Mora, and San Miguel Counties. Three riparian areas managed by the Taos Field Office (Canadian River, Carizzo Creek, and Mora River) lie adjacent to river or stream segments supporting populations of the Arkansas River shiner.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Improvement of riparian habitat function as a result of the implementation of the proposed action would include the reduction of soil erosion from

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riparian areas and increased filtering of stream flows. Reduced erosion and increased filtering would potentially contribute to an improvement in water quality within associated streams. This situation would be expected to be slightly beneficial to the Arkansas River shiner, which is threatened by water quality degradation, among other factors.

Because only a small proportion of riparian habitat along the streams supporting the Arkansas River shiner is managed by the BLM, the contribution to water quality improvement from BLM actions would be expected to be quite small as well. Increased riparian species diversity, structural diversity, and productivity resulting from implementation of the proposed action would also potentially benefit the Arkansas River shiner by increasing detrital input to the aquatic system, increasing the aquatic invertebrate food base, and increasing streamside shading. The cumulative impact associated with the *"May Affect – Not Likely to Adversely Affect"* determination would be an increase in the quality of habitat to support the Arkansas River shiner.

A.2.13 Colorado Pikeminnow (*Ptychocheilus lucius*)

Distribution and Ecology: The reasons for the decline of the Colorado pikeminnow (formerly known as the Colorado squawfish) include habitat fragmentation, modification, and degradation from dam construction. These fish have also been adversely affected by competition and predation from introduced non-native fishes. Alterations of natural hydrographs as a result of storing and releasing water continue to affect the Colorado pikeminnow by changing its environmental cues for spawning and by providing a competitive benefit to non-native fishes. Changes in flow release temperatures from major dams have rendered portions of the species' historic range uninhabitable. The Colorado pikeminnow has been identified from the main stem of the San Juan River in Rio Arriba and San Juan Counties. Although Rio Arriba County is included within the Taos Field Office area, no habitat necessary to support the Colorado pikeminnow occurs within streams associated with riparian areas under the management of the Taos Field Office.

Effects Determination: *No Effect.* Since no habitat that supports the Colorado pikeminnow is associated with the specified riparian areas addressed within this EIS, the BLM has determined that implementation of Adaptive Management would result in a *"No Effect"* determination for the Colorado pikeminnow. Therefore, the cumulative impacts presently existing (e.g., federal, private, and state activities) for this species would not change because of this action.

A.2.14 Boreal Western Toad (*Bufo boreas boreas*)

Distribution and Ecology: The preferred habitat for the boreal western toad in New Mexico is beaver ponds at high elevations (above 8,500 feet). The historic range for the boreal western toad extends from Alaska to New Mexico. In New Mexico, the toad has been known from only three lakes in the San Juan Mountains (Laguinitas, Trout, and Cajilon) in Rio Arriba County. However, it is believed that the boreal western toad may be extirpated from the state (BLM 1999). This species appears to be exclusively a high mountain form. The chief threat to the boreal western toad in the state was probably the destruction of beaver ponds. Other threats to the species include disturbance, degradation, and loss of wetland habitats and conversion of small ponds into larger reservoirs by damming. Although Rio Arriba County lies within the Taos Field Office area, none of the riparian areas managed by the Taos Field Office include the preferred habitat (high elevation

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ponds) of the boreal western toad. The Rio de los Pinos riparian area is located at 8,300 feet and the Rio San Antonio riparian area is located at 8,100 feet, and both are in northern Rio Arriba County. However, these riparian areas occur along perennial streams, and there is no indication that the boreal western toad ever occurred in these areas.

Effects Determination: *No Effect.* Since the riparian areas managed by the Taos Field Office do not coincide with the known habitats for the boreal western toad, and because the species is probably extirpated from New Mexico, the BLM has determined that implementation of Adaptive Management would result in a *"No Effect"* determination for the boreal western toad. There would be no incremental increase in the existing or foreseeable future cumulative impacts within the Taos Field Office area for this species, and the cumulative impacts presently existing (e.g., federal, private, and state activities) for this species would not change because of the proposed riparian and aquatic habitat adaptive management practices.

A.2.15 Chiricahua Dock (*Rumex orthoneurus*)

Distribution and Ecology: Chiricahua dock is a large, herbaceous, perennial plant. It is a riparian species that occurs near or adjacent to perennial springs or streams in shaded canyons from 6,500 to 9,000 feet in elevation (University of New Mexico 1997b). Chiricahua dock is found in subalpine grassland and montane conifer forest communities. The plant is rare throughout its range, which includes adjacent Arizona, and is confined to several populations. Within the Taos Field Office area, it occurs in San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Potential habitat for the Chiricahua dock may occur within a number of riparian areas managed by the Taos Field Office. Improved riparian functions would generally benefit native riparian plant species under the proposed action. Riparian habitat conditions would likely improve, and the species diversity in vegetative communities would likely increase. This change would be expected to benefit the Chiricahua dock. The cumulative impact associated with the *"May Affect – Not Likely to Adversely Affect"* determination would be an increase in the quality of habitat to support the Chiricahua dock.

A.2.16 Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*)

Distribution and Ecology: The Holy Ghost ipomopsis is an erect, herbaceous, short-lived perennial plant that flowers only once. This species is found on dry, open sites on steep, south- and southwest-facing canyon slopes and on road cuts that simulate natural canyon slopes. It occurs in ponderosa pine and montane mixed conifer forest vegetation communities from 7,800 to 8,200 feet in elevation in the southern part of the Sangre de Cristo Mountains (University of New Mexico 1997a). Threats to the Holy Ghost ipomopsis include habitat modification. This species is known from a single population in Holy Ghost Canyon on the Santa Fe National Forest, San Miguel County.

Effects Determination: *No Effect.* This species does not occur near or within the riparian areas managed by the Taos Field Office. Because Adaptive Management would have no impact on the Holy Ghost ipomopsis, there would be no incremental increase in the existing or foreseeable future cumulative impacts within the Taos Field Office area for this species, and the cumulative impacts presently existing (e.g., federal, private, and state activities) would not change because of the proposed riparian and aquatic habitat adaptive management practices.

A.3 EVALUATIONS OF STATE-LISTED AND BLM-SENSITIVE SPECIES

A.3.1 Big Free-Tailed Bat (*Nyctinomops macrotis = Tadarida m., T. molossa*)

Distribution and Ecology: The big free-tailed bat occurs in New Mexico from late May through late October. It prefers coniferous and mixed woodland and depends on rocky cliffs with crevices and fissures for roosting. These bats have been found in sycamore, cottonwood, and rabbitbrush riparian habitats. They feed on invertebrates, particularly moths. The big free-tailed bat may be limited by the availability of suitable drinking sites (e.g., large, obstacle-free ponds). It occurs in Los Alamos and Rio Arriba Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.2 Fringed Myotis (*Myotis thysanodes*)

Distribution and Ecology: The fringed myotis inhabits mid-elevation grasslands, deserts, and oak and pinyon woodlands. Additionally, it occurs in high-elevation spruce-fir forests. Roosts have been located in ponderosa pine and mixed conifer habitat types. Large snags are roost sites for both pregnant and lactating bats. The bats occupy mines, caves, and buildings transiently during the night. They feed on invertebrates and forage over water courses. Accessible surface water, suitable roost sites, and food are necessary components of viable habitat.

Threats to the species include human disturbance at roost sites, cave destruction, and habitat loss. Adverse management practices include creation of even-age forest stands, livestock grazing in riparian areas, and pesticide use. The bat occurs in Colfax, Mora, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.3 Goat Peak Pika (*Ochotona princeps nigrescens*)

Distribution and Ecology: In New Mexico, the Goat Peak pika is confined to talus slides and boulder fields in alpine and subalpine areas. It occurs commonly within the Jemez Mountains on patches of large talus slopes. The occurrence of the pika in the Jemez Mountains is associated with the distribution of the permafrost condition, which produces and maintains appropriate talus-slope habitat. The Goat Peak pika is not found below an elevation of 8,000 feet in Colorado. It cannot tolerate temperatures above 82.4° F for more than 2 hours. The presence of pikas on most patches of appropriate talus indicate that they disperse sufficiently to maintain the population. Loss of habitat can occur by increasing moisture in dry areas, which promotes colonization of vegetation that fills the talus slopes. The Goat Peak pika occurs in Los Alamos and Rio Arriba Counties.

Effects Determination: *No Effect.* Suitable habitat is not present within or adjacent to riparian areas.

A.3.4 Long-Eared Myotis (*Myotis evotis*)

Distribution and Ecology: The long-eared myotis is active in New Mexico at least from the end of June to mid-August. Its roosts have been located in ponderosa pine and mixed conifer habitat types. This insectivorous bat is seemingly a species of the yellow pine zone and above (e.g., it has been collected at an elevation of 9,600 feet). Roosting substrates include ponderosa pine snags, downed logs, stumps, and rock crevices.

The long-eared myotis principally feeds by gleaning insects off vegetation. Accessible surface water, suitable roost sites, and food are necessary components of viable habitat. The extensive use of both live and dead trees by these bats in pinyon-juniper habitats has important implications in the regulation of fuelwood harvest and salvage logging in the southwest. Adverse management practices include creation of even-age forest stands, livestock grazing in riparian areas, and pesticide use. The bat occurs in Colfax, Rio Arriba, San Miguel, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.5 Long-Legged Myotis (*Myotis volans*)

Distribution and Ecology: The long-legged myotis has been found primarily at the ponderosa pine zone or above, although some of these bats have come from grasslands. They occur in the state from at least mid-May to late September. They are found in sycamore, cottonwood, and rabbitbrush riparian habitats. They also occur in various coniferous and deciduous woodlands and coniferous forests. They use cavities in deciduous and coniferous trees. Roost sites have been located in ponderosa pine and mixed conifer forest types. A maternity colony has been found in an abandoned building (near Eagle Nest in Colfax County). Maternity colonies may also occur in attics, caves, and live or dead trees. Large snags serve as roost sites for pregnant and lactating bats. Large snags that are well distributed in a landscape may help maintain bat populations. The bats forage about 30 feet over the tree canopy and along the stream bank. Access to water, suitable roost sites, and food are necessary components of viable bat habitat in the Southwest.

Adverse management practices include creation of even-age forest stands, livestock grazing in riparian areas, and pesticide use. Restricting the disturbance to this species is beneficial. It occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.6 New Mexican Meadow Jumping Mouse (*Zapus hudsonius luteus*)

Distribution and Ecology: The New Mexican meadow jumping mouse occurs locally in the San Juan, Jemez, and Sacramento Mountains and in the central-northern and central Rio Grande Valley of New Mexico. There have also been single records of it occurring in Taos and Valencia Counties. Key habitat areas occur along the Rio Cebolla in the Jemez Mountains, the vicinity of Espanola, Isleta Marsh (Bernalillo County), Bosque del Apache National Wildlife Refuge, and the Cloudcroft area. It may also still occur near El Rito (Rio Arriba County) and in Socorro County.

The New Mexican meadow jumping mouse is associated primarily with riparian habitats in open prairies. These conditions include permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs. Such habitats include wet meadows, edges of permanent ditches, and cattail stands. Its home range varies from 0.15 to 1.09 acres. The omnivorous New Mexican jumping mouse feeds primarily on seeds, fruits, and insects.

Isolated populations of the New Mexican meadow jumping mouse are threatened by both agricultural and industrial development along major rivers and by recreational development and range management activities in montane areas. It requires relatively dense vegetation for population persistence. Thus, its scarcity may be related to livestock overgrazing in streamside habitats. Periodic severe flooding may also be detrimental to the New Mexican meadow jumping mouse. It occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.7 Occult Little Brown Bat (*Myotis lucifugus occultus*)

Distribution and Ecology: Roost sites for the occult little brown bat have been located in ponderosa pine and mixed conifer habitats. Known summer roosts in New Mexico are buildings. Large snags serve as roost sites for pregnant and lactating bats. No hibernacula have been discovered for this species in New Mexico. The occult little brown bat is associated with permanent waters (e.g., streams, drainage ditches, and lakes). Areas without permanent water support only transient individuals. Aquatic insects are a major component of their diet. They forage over water or over shrubs near water.

The availability of appropriate roosts may limit populations. Disturbance of roosts may be responsible for the decline of this species. Access to water, suitable roost sites, and food are necessary components of viable bat habitat in the Southwest. Adverse management practices include creation of even-age forest stands, livestock grazing in riparian areas, and pesticide use. Restricting the disturbance to this species is beneficial. It occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.8 Pale Townsend's (= western) Big-Eared Bat (*Plecotus townsendii pallescens*)

Population and Ecology: Population concentrations of pale Townsend's big-eared bats occur in areas with substantial surface exposures of cavity-forming rocks and in old mining districts. Among the North American bats, it appears to be among the most dependent on abandoned or inactive mines. It occurs in a variety of xeric and mesic habitats, including desert scrub, sagebrush, chaparral, and coniferous and deciduous forests. The bat feeds on insects, particularly moths. In California, Townsend's big-eared bat has been found to forage within forest habitats and along heavily vegetated stream corridors. It avoids open, grazed pastureland.

This bat species is threatened by habitat loss, vandalism, and disturbance by cave explorers. Townsend's big-eared bats have a strong preference for noctuid moths. These moths are obligate users of lentic vascular hydrophytes (e.g., cattails, willows, *Polygonum* species). Thus, wetland degradation could indirectly affect the bat. Beneficial management practices for this species would be to improve riparian and wetland habitats near roosts. It occurs in Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.9 Pecos River Muskrat (*Ondatra zibethicus ripensis*)

Distribution and Ecology: The Pecos River muskrat now occurs only in New Mexico, where it is a year-round resident in the Rio Grande and Pecos River basins; however, its historic range included Texas. The population is rather widespread in New Mexico, occurring in eight counties, including San Miguel. It is common in Bosque del Apache National Wildlife Refuge. Its habitat ranges from marshes along the Rio Grande, Pecos, and San Juan Rivers to mountain lakes. The Pecos River muskrat inhabits shallow sloughs and marshes (including irrigation and drainage ditches) associated with a constant and stable source of water. The Pecos River muskrat feeds on grasses and forbs. It constructs a bank den, with the entrance generally a foot below the water surface. Breeding takes place in spring and summer. Management actions that promote the growth of emergent vegetation are beneficial to the Pecos River muskrat.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.10 Small-Footed Myotis (*Myotis ciliolabrum*)

Distribution and Ecology: The small-footed myotis seems to be most common in coniferous and mixed woodland and montane coniferous forests. However, the bat has also been found in shortgrass plains, grasslands, and oak savannas and woodlands. This bat species is commonly associated with willows along streamsides. The bats are also found in sycamore, cottonwood, and rabbitbrush riparian areas. The small-footed myotis may primarily roost in caves or rock crevices. Trees and man-made buildings are also utilized.

Access to water, suitable roost sites, and food are necessary components of viable bat habitat in the Southwest. Adverse management practices include creation of even-age forest stands, livestock grazing in riparian areas, and pesticide use. Restricting the disturbance to this species is beneficial. It occurs in Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.11 Southwestern Otter (*Lutra canadensis sonorae*)

Distribution and Ecology: The southwestern otter is associated with permanent water sources and is therefore associated with riparian areas. Overhanging vegetation is an important component of otter habitat. Den sites include vacated beaver or nutria dens or abandoned man-made structures. Fish make up the greatest portion of the diet, although otters also feed on crayfish, larger aquatic insects, frogs, turtles, and other animals that frequent streams.

Population declines of the southwestern river otter are associated with channelization, bank-armoring, marshland draining, other kinds of habitat destruction, and harvesting. Otters do not generally live near humans because of associated environmental disturbances. Surface mining and oil and gas development may seriously impact otter populations through effects on water quality, habitat suitability, and prey availability. This species appears to be extirpated in New Mexico. The last confirmed occurrence in the state was in 1953. The occasional, unverified reports for the upper Rio Grande in Taos County may be from dispersal of animals recently introduced in Colorado or Arizona. The otter is recorded as having occurred in Rio Arriba and Taos Counties in the past.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Although the occurrence of the southwestern otter in the upper Rio Grande system is uncertain, potential habitat for this species may exist within stream segments containing riparian area managed by the Taos Field Office. Implementation of the proposed action would provide a slight improvement to water quality, streamside vegetation density, and prey availability, which may provide a slight benefit to this species.

A.3.12 Spotted Bat (*Euderma maculatum*)

Distribution and Ecology: In New Mexico, the preferred habitat for the spotted bat is meadows in subalpine coniferous forests. Nevertheless, individuals range from low deserts to coniferous forests, and they are often reported near cliffs over perennial water. They may be summer residents in forested areas and migrate through lower elevations during other seasons. Rocky areas appear to be an important element of this bat's environment. Spotted bats will roost in coniferous forests, cliffs, or canyons. Riparian habitat appears to be important to spotted bats. They forage primarily over standing water. Moths appear to be the principal food of the spotted bat.

Threats to the spotted bat include loss and degradation of riparian and forest habitat. Adverse management practices include creation of even-age forest stands, prescribed fires, livestock grazing in riparian areas, and pesticide use. The bat occurs in Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.13 Yuma Myotis (*Myotis yumanensis*)

Distribution and Ecology: In New Mexico, the zonal center of abundance for the Yuma myotis is desert, grassland, and woodland as well as the riparian communities of these zones (4,000 to 7,000 feet in elevation). Its distribution is tied to permanent water courses, usually below the coniferous forest. Railroad bridges and buildings are common summer retreats. Roost sites include rock crevices, caves/mines, swallow nests, and man-made structures. The Yuma bat is a surface-water forager that feeds on various invertebrates.

Adverse management practices include creation of even-age forest stands, livestock grazing in riparian areas, and pesticide use. Restricting the disturbance to this species is beneficial. It occurs in Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.14 Baird's Sparrow (*Ammodramus bairdii*)

Distribution and Ecology: Baird's sparrow is a neotropical migrant. It is a rare migrant in New Mexico, occurring primarily in the eastern plains and southern lowlands; however, it may winter in some locales (e.g., Roswell area). Recent records are mainly in the Animas Valley (Hidalgo County), a key habitat area. It may also be more or less regular in the Dry Cimarron Valley (Union County) and near Nutt (Luna County). It has been known to occur in Colfax, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties in the Taos Field Office area and is generally considered transient in northern New Mexico.

It is a grassland species that breeds in the northern Great Plains. In New Mexico, it has been found in a variety of habitats, ranging from desert grasslands in the south, to prairies in the northeast, and to mountain meadows in the San Juan and Sangre de Cristo Mountains. Food consists of seeds (especially grasses) and insects.

Reasons for the decline of Baird's sparrow are probably related to the effects of drought, agriculture, and grazing on the shrubby shortgrass habitats. The loss of cover and seed crops probably has the most deleterious effects on migratory and winter habitats. In 1994, only three individual birds at two sites were reported in New Mexico. Management practices to improve the status of Baird's sparrow would include range improvements that would leave more cover and allow for greater production of grass seeds.

Effects Determination: *No Effect.* The habitat of this species is not associated with riparian areas.

A.3.15 Black Tern (*Chlidonias niger*)

Distribution and Ecology: The black tern migrates statewide and is considered rare to locally fairly common. The tern is most frequent in summer in the San Juan Valley, Jicarilla Apache Indian Reservation, middle Rio Grande Valley, and Bitter Lake National Wildlife Refuge. Habitats utilized include desert riparian deciduous woodlands, especially those with cottonwoods. Black terns breed in prairie wetlands, taiga bogs, and marshes in the northern United States and southern Canada. Foods include fish and invertebrates.

Limiting factors affecting this bird species include fluctuating water levels that eliminate nesting. Management practices that are adverse to the black tern include draining wetlands. Beneficial management practices include restricting habitat disturbance, improving wetlands, and establishing artificial islands or rafts in water. The black term occurs in Colfax, Rio Arriba, and San Miguel Counties in the Taos Field Office area.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.16 Ferruginous Hawk (*Buteo regalis*)

Distribution and Ecology: The ferruginous hawk occurs as a localized resident almost statewide but is considered to be rare or uncommon as a state resident. It also migrates and winters statewide and is considered rare to fairly common in this capacity. These hawks breed in open country (usually prairies, plains, and badlands) and nest in trees and bushes, ledges, large rocks, riverbanks, and hillsides. They depend on native grasslands where nest sites are scarce. Thus, they reuse nest sites and add to nests annually; nests are sometimes more than 9 feet tall. The ferruginous hawk is often associated with prairie dog towns. Its territory covers about 10 square miles. The hawks feed mostly on rodents and rabbits but also consume reptiles and large insects.

Nest sites are considered vulnerable to human disturbance, and many hawks are shot while perched along roads. However, a larger threat is conversion of grasslands to monotypic rowcrops. Prairie dog control programs are also a threat to the hawk. Activities considered adverse to the ferruginous hawk include road construction, mining, and vegetation removal by chaining. Beneficial management practices include restricting disturbance, leaving large trees, and controlled (versus uncontrolled) livestock grazing. This hawk occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.17 Harlequin Duck (*Histrionicus histrionicus*)

Distribution and Ecology: The harlequin duck inhabits streams that contain emergent plants or a narrow band of deciduous trees and shrubs. Breeding pairs are generally associated with turbulent, high mountain streams in subalpine areas. The duck nests on the ground among boulders or in tree or cliff cavities near streams. It winters in rough surf along rocky seashores. Recent records are limited to individuals seen on front range lakes and reservoirs. The harlequin duck feeds on invertebrates and small fish. It is listed as accidental in New Mexico; records exist for only Rio Arriba and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species by increasing streamside emergent and woody vegetation.

A.3.18 Loggerhead Shrike (*Lanius ludovicianus*)

Distribution and Ecology: Loggerhead shrikes are rare to fairly common statewide residents. They nest in sagebrush areas, desert scrub, pinyon-juniper woodlands, and woodland edges. Open country interspersed with improved pastures, grasslands, and hayfields is primary shrike habitat. They are usually seen in relatively dry habitats dominated by shrubs and desert saltgrass. Bare ground is also a key component in some areas. Prey generally consists of large insects and small mammals. They also feed on lizards and will occasionally eat carrion. The loggerhead shrike defends a territory up to 2,000 feet in radius.

Declines in the loggerhead shrike population are attributed to contaminated prey, loss of nesting sites (e.g., hedgerows and thorn trees), and loss of pastureland feeding habitat. Loggerhead shrikes are unresponsive or show mixed responses to livestock grazing. The species occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties in the Taos Field Office area.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat or prey of this species.

A.3.19 Northern Goshawk (*Accipiter gentilis*)

Distribution and Ecology: New Mexico is at the southern edge of the northern goshawk's general breeding distribution and has the smallest known breeding population among the 11 Western states. In 1996, there were at least 132 northern goshawk breeding territories in New Mexico. The bird occurs locally in mature, closed canopied, coniferous forests (e.g., ponderosa pine, mixed species, and spruce-fir) at lower elevations (2,800 to 5,500 feet) on mountains and high mesas. It will also use deciduous woodlands and shows a preference for openings with water nearby. Goshawks prefer to nest within 0.25 mile of water in forest blocks that are more than 200 acres. Nest sites are generally in areas with large trees and dense canopies, typically on slopes with northerly exposures. The birds select large, older trees for nest sites. Their nesting home range is about 6,000 acres (with a nest area of about 30 acres, post-fledging family area of about 420 acres, and foraging area of about 5,400 acres). Some evidence exists that in the Southwest, northern goshawks winter on or near their nesting home range.

Northern goshawks are predators of forest birds and mammals. Snags, downed logs, woody debris, forest openings, large trees, herbaceous and shrubby understories, and a diversity of vegetation stages are important features that affect the presence and condition of prey populations.

Habitat loss is believed to be responsible for the decline in the species. The goshawks are threatened by human disturbance, poaching, pesticides, loss of suitable nest trees, and loss of nesting and foraging habitats due to timber harvesting and livestock grazing. Accumulated fuels and dense forest conditions resulting from fire suppression have increased the potential for loss of goshawk habitat through catastrophic wildfires and epidemic infestations of insects and diseases. Increased shading resulting from dense regeneration has also reduced herbaceous and shrubby understories that are important for prey species. Livestock and wildlife browsing and grazing have accentuated this loss. Also, timber harvesting, which began in the 1800s, has focused on large trees, resulting in few remaining mature and old forests and associated habitat attributes. In the Taos Field Office area, northern goshawks occur in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: No Effect. Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.20 Western Burrowing Owl (*Athene cunicularia hypugea*)

Distribution and Ecology: Western burrowing owls summer and occasionally winter in New Mexico, although they normally winter south of the Mexican border. They often nest colonially in abandoned burrows of prairie dogs, ground squirrels, woodchucks, and other mammals. These owls breed in grasslands, prairies, or open areas near human habitation (e.g., golf courses and airports). The owls occur at lower (2,800 to 5,500 feet) and middle (5,000 to 7,500 feet) elevations. Their home range averages about 2 acres. Insects make up the highest percentage of food items, except in biomass, more mammals are consumed.

Limiting factors for the western burrowing owl include the presence of burrow digging mammals, predation, starvation, diseases and parasites, and poisoning (indirect, related to efforts to control prairie dogs and ground squirrels). Features and factors that are adverse to the western burrowing owl include roads, hedgerows, snow/wind breaks with trees and shrubs, and increased vegetative diversity. Beneficial management practices are those that restrict habitat disturbances, establish artificial nest structures, create urban greenbelts, and ensure controlled (versus uncontrolled) livestock grazing. The owl occurs in Colfax, Mora, and San Miguel Counties.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat or prey of this species.

A.3.21 White-Faced Ibis (*Plegadis chihi*)

Population and Ecology: The white-faced ibis is a statewide migrant and is considered rare to uncommon and local during both migration and summers. The birds are generally seen in association with shoreline and marsh habitats that border open water, usually at lower elevations (2,800 to 5,500 feet). Vegetation within these areas often consists of cattails and rushes, but other plant species (including occasional shrubs and trees) are frequently present. Nesting colonies are located in shrubs and low trees or in dense standing reeds and tules near or in large marshes. White-faced ibises usually nest in mixed colonies with snowy egrets, cattle egrets, and black-crowned night herons. They feed on crayfish, frogs, grasshoppers, other invertebrates, and plants (fruits, seeds and cones).

Limiting factors for the white-faced ibis include a restricted number of breeding locations, exposure of breeding colonies to fluctuating water levels, risk of pesticide poisoning, and disappearance of wetland habitats. Human disturbance can cause the birds to abandon roosting areas. The white-faced ibis occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties in the Taos Field Office area.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.22 Yellow-Billed Cuckoo (Coccyzus americanus)

Distribution and Ecology: The yellow-billed cuckoo is found in woodlands throughout the United States. It is a regular breeder in New Mexico. The cuckoos migrate and are summer residents statewide and are considered rare to fairly common. They are associated with lowland deciduous woodlands, willow and alder thickets, second-growth woods, deserted farmlands, and orchards. Breeding occurs in San Juan, Dry Cimarron, Rio Grande, Pecos, Mora, Canadian, San Francisco, and Gila River valleys. Nesting sites include riparian woodlands and similar habitats. The cuckoos feed primarily on insects.

The populations of yellow-billed cuckoos fluctuate in response to changes in caterpillar abundance. Loss and disturbance of riparian habitat in the West also account for the species decline. Other effects may be related to increased predation or disturbance of the winter range in South America. Management practices that adversely affect the cuckoo include clearcutting, agriculture, livestock grazing, and pesticide use. Maintaining small forest openings and establishing urban greenbelts and woodlots are beneficial to the species. Yellow-billed cuckoos occur in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.23 Texas Horned Lizard (*Phrynosoma cornutum*)

Distribution and Ecology: The Texas horned lizard inhabits flat, open, generally dry country with little plant cover except for bunchgrass and cactus. In New Mexico, it occurs between about 2,800 and 6,800 feet in elevation. It is strictly terrestrial and can bury itself in loose soil that is sandy, loamy, or rocky. It also seeks shelter under rocks. These lizards are often associated with prairie dog towns. Populations of the Texas horned lizard occur in both grazed and ungrazed areas. The preferred prey of the Texas horned lizard is ants. It occurs in Colfax, Mora, San Miguel, and Santa Fe Counties in the Taos Field Office area, but not in riparian areas.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.24 Jemez Mountains Salamander (*Plethodon neomexicanus*)

Population and Ecology: The Jemez Mountains salamander is endemic to north-central New Mexico (e.g., Jemez Mountains in Sandoval, Los Alamos, and Rio Arriba Counties). More than 90% of the populations are believed to occur on lands administered by the Santa Fe National Forest. This small woodland salamander is found in mixed conifer and spruce-fir forests above 7,200 feet in elevation. It usually occurs below the surface (e.g., under rocks and in fallen logs). Old stabilized talus slopes are important cover, especially those with a good cover of damp soil and plant debris. Its prey consists of insects and other small invertebrates.

Habitat alteration continues to be a threat to the species. Any activity that creates drier conditions can be detrimental (e.g., timber-cutting and other vegetation clearing, overgrazing, and forest fires). It occurs in suitable habitat in Los Alamos and Rio Arriba Counties in the Taos Field Office area.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.25 Flathead Chub (*Platygobio (= Hybopsis) gracilis*)

Distribution and Ecology: The flathead chub is native to the Rio Grande, Pecos, and Canadian drainages. The distribution of the species is expanding in the Rio Grande drainage and stable in the other drainages. Its habitat is turbid water in the main channels of large streams and tributaries. It is found in moderate to strong currents. The flathead chub seems to prefer permanent streams and avoids shallow water. It is omnivorous, feeding on invertebrates, algae, and some vascular plants.

Management practices and developments that adversely impact the species include impoundments, dredging, channelization, irrigation, and livestock grazing in riparian zones. It occurs in Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe, and Taos Counties in the Taos Field Office area.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.26 Plains Minnow (*Hybognathus placitas*)

Distribution and Ecology: The range of the plains minnow includes New Mexico, Colorado, and Oklahoma, although historically it extended to Montana, Illinois, and Kentucky. The native population in New Mexico occurs in the Canadian and Dry Cimarron River drainages along the main channels and a short distance up tributary streams. An introduced population occurs in the Pecos River drainage. In New Mexico, it occurs in five counties, including Colfax and San Miguel Counties in the Taos Field Office area. Habitat for the plains minnow includes clear to turbid water with sandy river substrates. It consumes microflora from rocks, snags and plant roots.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.27 Roundtail Chub (*Gila robusta*)

Distribution and Ecology: In New Mexico, the roundtail chub has been extirpated in the San Francisco and Zuni Rivers and has been reduced elsewhere. Its abundance has continued to decline in the San Juan and Gila drainages. It occurs in the mainstem San Juan River from the Navajo Reservoir downstream to the Four Corners area and in the Mancos, Navajo, and Animas Rivers (San Juan and Rio Arriba Counties in the Taos Field Office area). It occurs locally in the Gila Basin in the East and Middle Forks, the confluence area of the West and Middle Forks, Turkey Creek, and sporadically in the mainstem of the Gila River downstream to the Middle Box. Although it occurs in Rio Arriba County, it does not occur within any stream segments containing riparian areas managed by the Taos Field Office.

The roundtail chub preys on aquatic and terrestrial invertebrates, small fish, and sometimes filamentous algae. Threats to the roundtail chub include habitat loss (e.g., due to dams, channelization, and removal of riparian vegetation) and possibly predation by non-native fishes. Contaminant loading in the San Juan River may also be affecting the species.

Effects Determination: *No Effect.* This species does not occur within stream segments containing riparian areas managed by the Taos Field Office.

A.3.28 Cockerell's Striate Disc (Snail) (*Discus shimeki cockerelli*)

Population and Ecology: The Cockerell's striate disc is a terrestrial snail that occurs in New Mexico and Arizona, although the historic range extended to Oregon and Montana. In New Mexico, it occurs only in Taos County. It is uncommon and localized over most of its current range but appears to be more common in the Sangre de Cristo Mountains of northern New Mexico. It generally occurs at elevations between 7,000 and 12,000 feet in spruce-fir forest. It is found under logs, rocks, and fallen woody debris.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.29 New Mexico Silverspot Butterfly (*Speyeria nokomis nitocris*)

Distribution and Ecology: Habitat for the silverspot butterfly includes moist meadows, seeps, marshes, and streamsides. Hosts of the caterpillar are violet species. Adult food is flower nectar, including that from thistles. The species has been affected by draining of habitat and by development. Moderate grazing is compatible and may be necessary (Struttmann 1999). The butterfly occurs in Los Alamos, Mora, San Miguel, and Taos Counties in the Taos Field Office area.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.30 Sangre de Cristo Peaclam (*Pisidium sanguinichristi*)

Distribution and Ecology: The Sangre de Cristo peaclam occurs only in New Mexico and only in Taos County. The only known population exists in Middle Fork Lake (elevation 10,900 feet) in Carson National Forest in the Sangre de Cristo Mountains. It is found in the substrate among emergent grasses of sheltered embayments and the lake outlet.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.31 Arizona Willow (*Salix arizonica*)

Distribution and Ecology: The Arizona willow is a mat-forming or shrubby willow typically 2 to 4 feet high. It generally occurs in unshaded or partly shaded wet meadows, along streamsides, or in cienegas at elevations above 8,000 feet. In New Mexico, it has been found in the Carson National Forest and in San Pedros Parks in the Santa Fe National Forest (University of New Mexico 1997c). It occurs in Rio Arriba and Taos Counties.

Effects Determination: *May Affect – Not Likely to Adversely Affect.* Implementation of the proposed action would provide a slight benefit to this species.

A.3.32 Dwarf Milkweed (*Asclepias uncialis* var. *uncialis*)

Distribution and Ecology: The dwarf milkweed is a herbaceous perennial plant that flowers from April to May. It occurs in short grass prairie and also conifer (pinyon-juniper) woodland, generally below 7,500 feet, and is often found on the lower side slopes of mesa escarpments and canyon walls (University of New Mexico 1997c). Although it is a fairly widespread species, it occurs in very low numbers. Its range includes Arizona, Colorado, New Mexico, Oklahoma, and Wyoming. In New Mexico, it occurs in four counties, including Colfax and San Miguel Counties in the Taos Field Office area.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.33 Ripley's Milkvetch (*Astragalus ripleyi*)

Distribution and Ecology: Ripley's milkvetch grows on volcanic substrates in open ponderosa pine-Arizona fescue savannahs or on the edges of closed canopy ponderosa pine, mixed conifer, or pinyon-juniper woodlands with an Arizona fescue understory (University of New Mexico 1997c). The plant also occurs in pinyon-juniper-oak and big sagebrush associations. These associations may be occasionally impacted by brush control projects. Ripley's milkvetch is also a palatable species that is grazed by livestock and wildlife. Its range extends from Conejos County, Colorado, to Taos and Rio Arriba Counties in New Mexico. Within the Taos Field Office area, it occurs in Rio Arriba and Taos Counties.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.3.34 Santa Fe Cholla (*Opuntia viridiflora*)

Distribution and Ecology: Santa Fe cholla occurs on south- and west-facing slopes in pinyon-juniper woodlands at an elevation of

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about 7,200 feet. It is best known from the vicinity of Fort Marcy Park within the city limits of Santa Fe (University of New Mexico 1997c). The Santa Fe cholla is endangered by habitat destruction from urbanization within the City of Santa Fe.

Effects Determination: *No Effect.* Implementation of the proposed action would not be expected to affect the habitat of this species.

A.4 REFERENCES FOR APPENDIX A

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